

Report

Ministry of the Environment

The Economic Benefits of Recycling in Ontario - Final Report



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Prepared by:

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Project Number:

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Date:

September 23, 2009

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Ilan Salamon
Senior Economist
Waste Management and Policy Branch
Ontario Ministry of the Environment
135 St. Clair Ave. W., 7th Floor
Toronto, Ontario
M4V 1P5

Dear Mr. Salamon:

We are pleased to submit the following Report that looks at the economic impacts of recycling in the Province of Ontario. We have undertaken a significant amount of analysis to produce this report and believe that the results are accurate.

The report is formatted in a fact sheet profile to make each section and sub-section stand out clearly and independently. This format makes the document easy to read and communicate. In effect, it is a tool that readily facilitates the compilation of statistics, briefing notes and updates by the Ministry of the Environment.

We advise the Ministry of the Environment that we have made some assumptions around the flow of material into Ontario markets, the timing of the WEEE Phase 1 program, and the value of reused and refurbished WEEE materials. Our assumptions reflect the best information available at this time.

We are very appreciative of the opportunity to undertake this assignment for the MOE and we hope the Ministry draws substantial utility from this final document. We look forward to discussing this report and its findings with the MOE. We are available to meet in the near term. If there are any questions or you would like to arrange a meeting, do not hesitate to contact me.

Sincerely,

AECOM Canada Ltd.

A handwritten signature in black ink, appearing to read 'A. Keir', with a long horizontal line extending to the right.

Andy Keir, M.Sc. (Econ), MCIP, RPP
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AK:lb

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JME Maxwell, M.B.A., PMP

Executive Summary

Executive Summary

1.1 Objective and Approach

The objective of this study is to document the size of Ontario's recycling and reuse industry associated with the following three waste diversion programs (Figure E-1).

Figure E-1 Scope of Waste Diversion Programs



Source: AECOM, 2009

The economic impacts of the respective programs were derived using Statistics Canada's Inter-Provincial Input Output (I/O) Model. Value chains were developed for each program to identify downstream sectors. These sectors were then shocked for the Province of Ontario to produce a set of direct and indirect sector multipliers. Induced multipliers were derived from a separate shock of the I/O Model against personal expenditures for the Province of Ontario.

In parallel with the preceding, a set of Quantrix models were developed for each of the programs. The models generated impacts for past and present data and also calculated future impacts based on projected data. For each of the selected sectors the I/O Model was shocked with a \$1 billion investment. This means that the I/O model was calibrated and run with a \$1 billion input to gross investment. A variety of outputs and multipliers for sectors and commodities were then calculated by the I/O Model based on this calibration.

The terms of reference specified that the Statistics Canada I/O Model be used to determine the economic effects of the subject programs on the provincial economy. The downstream sectors incorporated in the analysis include the following:

- Paper to 3221 Pulp, Paper and Paperboard Mills;
- Plastics to 3261 Plastic Product Manufacturing;
- Glass to 3272000 Glass and Glass Product Manufacturing;
- Steel to 331100 Iron and Steel Mills and Ferro Alloy Manufacturing; and
- Aluminum to 331313 Primary Production of Alumina and Aluminum.

Executive Summary

1.2 Blue Box Program Summary

Between 2002 and 2007, the amount of Blue Box material marketed grew from roughly 727,000 tonnes to 902,000 tonnes. In 2007, costs were in the order of \$253 million and revenues were roughly 42% of costs, at \$107 million. In the same year, the Blue Box Program and its associated upstream supply chain generated \$478 million in GDP, \$239 million in Labour Income and \$793 million in Gross Output. It also created 4,875 FTE jobs and generated \$29.3 million in taxes.

Blue Box materials predominately flow to five end use industrial sectors within the province:

- Paper manufacturing;
- Plastic product manufacturing;
- Iron and steel mills and ferro alloy manufacturing;
- Primary production of alumina and aluminum; and
- Glass and glass product manufacturing.

A significant portion of the Blue Box tonnage also moves to brokers, who in turn, resell the materials to end users both at home and abroad.

The estimated value of Blue Box commodities flowing directly and indirectly to end producers in Ontario in 2007 are:

- Paper - \$38.8 million;
- Aluminum - \$2.5 million;
- Steel - \$5.0 million;
- Plastic – \$7.1 million; and
- Glass – \$0.3 million.

Among the downstream industry sectors that purchase Blue Box material, the paper manufacturing sector generates the largest co-related economic output. Plastic is second, followed by iron and steel, aluminum and then glass. All sectors combined taking into account direct, indirect and induced effects generate about \$66 million in GDP, \$37 million in labour income and \$122 million in Gross Output within the Ontario economy. The FTE job creation generated by the downstream industry sectors total 734 jobs. The taxes generated by downstream industries total approximately \$4.7 million.

In combination the upstream and downstream economic effects of the Blue box program in 2007 yield \$545 million in GDP, \$275 million in labour income, \$915 million in gross output. FTE jobs created total approximately 5,600 and taxes sum to \$33 million

Between 2008 and 2012, the tonnes of Blue Box material forecast to be marketed grows from 911,000 tonnes to 952,000 tonnes. This forecast continues to reflect historic trends. The Blue Box program is a mature entity and volume growth is attributable to general population growth as opposed to increased capture of materials on a per capita basis.

Executive Summary

In 2008, the revenues are projected to be \$129 million which is 21% higher than the corresponding figure for 2007, but in 2009 they are forecast to only be \$54 million (about 50% of what they were in 2007). By 2012, the Blue Box revenues, at \$101, million show significant rebound from 2009 but they are still 22% below the 2007 figure. In general, the upstream economic outputs of the Blue Box program over the next five years are projected to be less than those generated in 2007. In the 2012 forecasts, total GDP is \$490 million, total income is \$245 million and total Gross Output is \$812 million. The 2012, the Blue Box program is projected to yield 4,990 jobs upstream in the Ontario economy. The tax generation in 2012 is expected to be \$30 million with 36% being federal, 34% being provincial and a fraction of a percent being municipal.

In 2012, the total value of Blue Box downstream commodity flows to Ontario end users is estimated to be in the order of \$41million. Paper commodities account for almost 60% of this value. Metals account for 22% of the total and plastics for 17%. Glass accounts for less than 1%. The projected pattern of economic outputs generated by the downstream industry sectors that purchase Blue Box material continues to reflect the current pattern. In 2012, the paper manufacturing sector is predicted to generate the largest co-related economic outputs respectively followed by plastics, iron and steel, aluminum and then glass. All sectors combined generate about \$48 million in GDP, \$27 million in income and \$91 million in Gross Output. Blue Box derived job outputs produced by the downstream industry sectors are projected to total just over 532 in 2012. The taxes that will be generated sum to approximately \$3.4 million.

In combination the upstream and downstream effects of the Blue Box program yield \$538 million in GDP, \$271 million in labour income and \$903 million in gross output. Approximately 5,500 FTE jobs are created and taxes sum to roughly \$33.4 million.

1.3 MHSW Program Summary

The economic impact of the implementation of the Phase 1 MHSW program to recycle and reuse residential hazardous waste was examined. In 2007 16,000 (35%) of the MHSW Phase 1 materials available for collection were diverted from the landfill.

The management of MHSW Phase 1 materials was a \$10.5 million business in 2007. 90% of this economic output was related to the costs of collection and processing materials, while 10% of the revenue was related to the sale of recovered commodities. Although this program is far from self-funding, it does deliver an important economic service to the residents of the province of Ontario. In 2007, the upstream impacts of this program resulted in the creation of \$14 million of value, \$7 million in worker salaries, and 140 jobs. Additional downstream economic impacts were generated in 2007 through the sales of recovered materials to other Ontario industries. Approximately \$900,000 of plastics and metals reclaimed from Phase 1 MHSW materials input into Ontario's plastic and metal processing industries. In 2007, these downstream inputs were not a major economic factor. Combined the upstream and downstream economic impacts were responsible for \$15 million of value, \$7 million in worker salaries, and 148 jobs.

Executive Summary

Forecasts of MHSW material flows and economic outputs have been developed from Stewardship Ontario's diversion and financial forecasts for Phase 1 of the MHSW program. It is forecast that diversion will double between 2007 and 2012, resulting in 33 thousand tonnes of MHSW Phase 1 materials being diverted from the landfill in 2012. Over the same time period, the economic output of the program will quadruple. By 2012, Phase 1 of the MHSW program will be a \$45 million business. As Phase 1 of this program grows, the upstream economic impacts are forecast to create \$60 million of value, \$30 million of salaries and 600 jobs by 2012. It is forecast that the value of reclaimed commodities will steadily increase from 2008 to 2012, resulting in \$3 million of metals and plastics being sold as inputs to other Ontario industries. The economic impacts from these downstream industries will remain relatively small in 2012. Combined in 2012 the upstream and downstream economic impacts will be responsible for \$62 million of value, \$31 million in worker salaries, and 630 jobs.

1.4 WEEE Program Summary

The economic impacts of the implementation of the Phase 1 WEEE program to recycle and reuse waste electronic and electrical equipment to the province of Ontario was examined. In 2007 9,000 tonnes (9%) of the WEEE phase 1 materials available for collection were reused and refurbished, and 19,000 tonnes (21%) of the materials were diverted from landfill.

The management of WEEE Phase 1 materials was a \$84 million business in 2007. Collection and processing accounted for just over 50% of this output; the remaining output came from reuse and refurbishment sales, and a small portion of recycled material sales. The upstream economic impacts from this program resulted in the creation of \$112 million of value, \$56 million of labour income, and 1,131 jobs in the province of Ontario. The economic impacts of Phase 1 of the WEEE program will have impacts downstream in industries that use recycled materials as industrial inputs. \$1.5 million of plastics and metals recovered from Phase 1 of the WEEE program will feed into downstream Ontario industries. This downstream spin-off has marginal economic impacts. Combined the upstream and downstream economic impacts were responsible for \$113 million of value, \$57 million in worker salaries, and 1,144 jobs.

Based on the forecast of program performance and financial data provided in the OES WEEE Program Plan, forecasts of WEEE material to be processed, economic output and economic data were prepared. It is forecast that reuse and refurbishment will increase from 9,000 tonnes in 2007 to 12,000 tonnes of Phase 1 material in 2012, and diversion will increase from 19,000 tonnes to 64,000 tonnes in 2012. The economic output of Phase 1 of the WEEE program will increase by 50% from 2007 to 2012. In 2012, Phase 1 of the WEEE program will be a \$124 million business, with upstream economic impacts creating \$165 million of value, paying \$82 million in salaries, and 1,700 jobs in Ontario. Although the value of recovered materials sold to Ontario industries will more than triple to \$5.1 million in 2012, the associated downstream economic impacts remain relatively marginal. Combined in 2012 the upstream and downstream economic impacts will be responsible for \$170 million of value, \$85 million in worker salaries, and 1,711 jobs.

Executive Summary

1.5 Combined Effects and Conclusions

The Blue Box program, Phase 1 of the MHSW program and Phase 1 of the WEEE program resulted in diversion of over 900,000 tonnes of waste from landfills in 2007. This is forecast to increase beyond 1 million tonnes of waste diverted by 2012. Most of the growth in diversion is forecast to come from phase 1 of the MHSW and WEEE programs.

In combination the three programs cost \$309 million to operate in 2007 and generated over \$145 million in revenues in the same year. These aggregated programs upstream economic impacts resulted in \$604 million in value creation, \$302 million in labour income and 6,200 jobs. The downstream impacts associated with the three programs accounted for an additional \$54 million in value creation, \$34 million in labour income, and 714 jobs in 2007. Combined the upstream and downstream economic impacts were responsible for \$658 million of value, \$340 million in worker salaries, and 6,914 jobs.

It is forecasted that the costs of operating these programs will grow to \$376 million by 2012, and will continue to generate \$160 million in revenues. These upstream economic impacts from the aggregated programs will create \$714 million in value, \$357 million in wages, and 7,300 jobs in the province of Ontario. Combined with the downstream economic impacts it is forecast that the three programs will create \$770 million in value, \$388 million in labour income through 7,900 Ontario based jobs.

The three recycling programs studied are 75% of the size of Ontario's waste disposal industry, they produce an order of magnitude more jobs per tonne of waste diverted than the waste disposal industry does per tonne disposed. The combined recycling programs directly added \$300 million to the province's GDP. This is a significant contribution to the Ontario Economy. The average salary for an employee directly employed in these programs is 22% greater than provincial average and is greater than the average salary in the finance, insurance, real estate and leasing industry.

Executive Summary

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Glossary of Terms and Acronyms

Glossary of Terms and Acronyms

CIF – Continuous Improvement Fund

Direct Effects - Initial changes in employment, income and output resulting from production spending in a subject sector.

Downstream Effects – Effects in sectors that purchase goods and services from a subject sector where initial production spending took place.

FBC – Food and Beverage Container

Full-Time Equivalent (FTE) Jobs - A ratio indicating the level of employment associated with a business where an FTE of 1.0 represents one person working at full time hours and an FTE of 0.5 represents one person working for half of that time.

Gross Domestic Product (GDP) – The value of all currently produced final goods and services created in a particular time period. This can be considered for the entire economy, or by industry.

Gross Output – The total value of sales related to a good or service, including the value intermediary goods or services used in their production.

HDPE – High Density Polyethylene

IC&I – Industrial, Commercial and Institutional

IFO – Industry Funding Organization

Input/Output (I/O) Models – Portray the economy of a geographic area for a fixed period of time. The models divide all economic activity into sectors. They initially calculate the effect of spending to produce one dollar's worth of output in a subject economic sector. Subsequently, they calculate the "rippled" effects of this first expenditure in all other sectors of the economy that support the subject sector.

Indirect Effects – Subsequent changes in employment, income, and output in all economic sectors that support sectors that are directly affected.

Induced Effects – Subsequent changes in employment, income and output in all economic sectors as a result of income spending by employees in the direct and indirect sectors.

Industrial Economic Output – (See Gross Output)

Glossary of Terms and Acronyms

Model Shock – specified expenditure in one or more industries or commodities within the input matrices that underlies the Statistics Canada Input-Output model.

Labour Income – the sum of wages and salaries plus supplementary income.

Multipliers - factors of proportionality that measure the effect of one variable on another. For example a \$1 million in gross output may result in \$1.3 million of GDP. The gross output to GDP multiplier is therefore 1.3.

MHSW – Municipal Hazardous or Special Waste

North American Industry Classification (NAIC) – Standard classification system used by national statistical agencies to collect, analyze, code, and report upon industry-related activity.

OES – Ontario Electronic Stewardship

PET – Polyethylene Terephthalate

Tax – the taxes referred to in this document include the following:

Federal

- Federal trading profits on lottery and race tracks
- Federal gas tax
- Federal duty tax
- Federal air tax
- GST

Provincial

- Provincial gallon tax
- Provincial trading profits
- Provincial gas tax
- Provincial amusement tax
- P.S.T
- H.S.T

Municipal

- Municipal amusement tax
- M.S.T

Upstream Effects – Effects in sectors that supply goods and services to a subject sector where initial production spending took place.

WDA – Waste Diversion Act, 2002

WDO – Waste Diversion Ontario

WEEE – Waste Electrical and Electronic Equipment

Glossary of Terms and Acronyms

Value Added – The difference between the value of a final product and the inputs that were used to create it.

Value Chain – A sequential chain of entities and activities that contribute directly or indirectly to the delivery of a service or product. Each link of the chain adds more value to the product or service being delivered.

Sources: Goldman and Ogishi (2001); Scarth (2000)

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Appendices

- A. Industry Survey
- B. Multipliers

Section 1: Introduction

1. Introduction

1.1 Scope and Purpose

The objective of this study is to document the size of Ontario's recycling and reuse industry associated with the following three waste diversion programs (Figure 1-1):

- The existing Blue Box program;
- The Phase 1 program for Municipal Hazardous or Special Waste (MHSW); and
- The program for Waste Electrical and Electronic Equipment (WEEE).

Specifically, the study identifies the direct, indirect and induced benefits to Ontario's economy generated by each of the programs individually and in combination. It also draws conclusions about the benefits to a jurisdiction's economy that might occur from non-hazardous waste diversion including recycling, based on a review of similar studies undertaken in other jurisdictions in Canada and the United States.

Figure 1-1 Scope of Waste Diversion Programs



Source: AECOM, 2009

There are three timeframes used in the study. The period 2002 to 2007 provides historic context of trends. The year 2007 is used as the current benchmark year because it is the most recent year with a full set of data. The projection period encompasses years 2008 through to 2012.

Section 1: Introduction

1.2 Approach

The study was undertaken in a series of steps. These are illustrated in Figure 1-2.

1.2.1 Project Initiation Meeting

A meeting was held with the Ministry of the Environment (MOE) at the outset of the study to review the proposal and to clarify the study objectives and deliverables.

1.2.2 Background Data Review and Collection

A variety of documents were reviewed to provide insight into:

- The subject programs and their historic and projected trends;
- The methods, findings and conclusions from similar studies carried out in other jurisdictions;
- The workings and requirements for using Statistics Canada's Inter-Provincial Input/Output Model (I/O Model); and
- Growth projections for the province of Ontario.

The Reference List at the end of this report sets out the various information sources used over the course of the study.

1.2.3 Historic Trends

Blue Box data from the WDO Datacall (WDO 2009a and WDO 2009b) were assembled for the years 2002 through to 2007 to provide an understanding of the materials collected, processed and marketed through the programs as well as the program costs and revenues.

In the cases of the MHSW and WEEE programs, their implementation has been quite recent and consequently there has been less than a full year of historic data available in both cases.

1.2.4 Economic Impacts

1.2.4.1 Value Chains and Statistics Canada I/O Model

The economic impacts of the respective programs were derived using Statistics Canada's Inter-Provincial I/O Model. Value chains were developed for each program to identify downstream sectors. These sectors were then shocked for the Province of Ontario at \$1 billion to produce a set of direct and indirect sector multipliers. In the case of Paper Manufacturing and Primary Aluminum Production, additional shocks at the national level were also commissioned to deal with Statistics Canada's confidentiality issues for provincial data.

Section 1: Introduction

Induced multipliers were derived from a separate \$10 billion shock of the Statistics Canada I/O Model against provincial expenditures in the Province of Ontario. Statistics Canada confirmed this to be an appropriate method for calculating generic (non-sector specific) induced multipliers. A special purpose built model was then developed to ripple induced income spending for each of the industry sectors under study.

1.2.4.2 *Quantrix Models*

In parallel with the preceding, a set of Quantrix models were developed for each of the programs. Quantrix is a business modeling and analytics software package. In each case one model dealt with upstream effects on the waste management and remediation sector and a second model dealt with effects generated on downstream sectors. These models were purpose built to allow calibration using program data and the use of multiplier information derived from the Statistics Canada I/O model shocks. The models generated impacts for past and present data and also calculated future impacts based on projected data.

1.2.5 **MOE Key Program Measurements**

In the Request for Proposal for this study the MOE set out specifications for a series of key program measurements. These measurements were incorporated into Quantrix models for calculation.

1.2.6 **Industry Surveys and Recycling and Reuse Establishments**

Two surveys, with waste service providers and with end users of recycled materials (Blue Box, WEEE and MHSW) were conducted and are referred to as “Industry Surveys” in this report. These surveys (along with a letter of introduction from the Ministry) are included in and reported on in Appendix A. The response rate was low; therefore the economic models are based on the value of commodity sales to downstream sectors. As an alternative we used published data and model derived statistics on commodity sales to downstream sectors to enable the calculation of downstream program effects.

At the outset of the study it was anticipated that a list of recycling industries could be readily assembled. Unfortunately this was not the case. An enumeration of these industries was not readily available and when organizations closely associated with the recycling industry were queried about this information they indicated that it was not available and suggested that significant effort would be required to produce it.

1.2.7 **Conclusions**

The final part of the study is framed in the concluding chapter of this report. There are 11 sections.

- Section 6.1 looks at the 3 programs in combination for the base year 2007
 - It sets out program diversion and re-use and refurbishment flows actual and projected.
 - It examines the combined costs and revenues associated with the 3 programs and then looks at:

Section 1: Introduction

- Their aggregated effect on the Ontario economy in 2007.
 - The aggregated economic effects of the 3 programs and their associated downstream market sectors on the Ontario economy in 2007.
- Section 6.2 provides the same examinations as above but for the end of the forecast period, 2012.
- Section 6.3 calibrates a set of MOE specified tables for the year 2007 for each program and then all three programs combined.
- Sections 6.4 and 6.5 respectively calibrate and discuss MOE specified tables for the year 2007 for end use manufacturers, as well as industries that re-use and remanufacture.
- Section 6.6 discusses the indirect economic effects of recycling on up-stream supply industries.
- Section 6.7 calibrates and discusses an MOE specified Table for solid waste disposal
- Section 6.8 examines the economic benefit of the recycling industry in comparison to several other industries in Ontario, as well as the Provincial average
- Section 6.9 looks at a set of US studies, notes their findings and discusses their differences with respect to the study at hand.
- Section 6.10 draws some overall conclusions of the entire study.
- The final section, 6.11 makes some recommendations for future studies.

Section 1: Introduction

Figure 1-2 Overview of Study Approach



Source: AECOM, 2009

Section 1: Introduction

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Section 2: Statistics Canada Input / Output Runs

2. Statistics Canada Input / Output Runs

The terms of reference specified that the Statistics Canada I/O Model be used to determine the economic effects of the subject programs on the provincial economy.

The basic premise of the Statistics Canada I/O Model is that it identifies and disaggregates all the sectors of the economy (including industries, suppliers and consumers) and their inter-relationships to understand the relationships of trade in the provincial economy (McCann 2001). The model can be shocked at any dollar amounts of output demand in various industries, to determine the impact industries have on the provincial economy. For example, a \$1 billion shock to the output demand of a certain industry will have upstream effects with regard to the industry itself and as well as other provincial and national industries that support it. By way of illustration, an upstream effect would occur to the manufacturers and suppliers of waste management equipment used at material recycling facilities.

The I/O Model can be run at four different levels: small (S), medium (M), historical link (L) and worksheet (W), which increase in level of detail, respectively.

The following points chronicle how the model was used.

- The I/O Model uses Canadian and provincial input-output tables to track and quantify the economic activity generated by changes in consumption and production. The Canadian input-output tables present one of the most detailed accounting frameworks available for the Canadian and provincial economies. As such, the model has significant ability to track the flow of goods and services between provinces, industries and consumers at relatively detailed levels.
- There are four levels of detail ranging from 243 industries by 679 commodities at the W or worksheet level to only 21 industries by 57 commodities at the S or small level. The L or historical link level is the second most detailed level and it allows for the construction of time series reports of annual data going back to 1961. The M or medium level is the second most aggregated level of data and it also allows time series construction.
- The I/O Model simulates the impact of a shock in industry output on the economy and associated “supplier” business sectors. The model exploits the inter-industry linkages of input and output tables to track the total production of goods and services for a specified shock.
- The first round of effects tracked by the model is termed “direct”. In this round, the model specifies the domestic industries that are directly responsible for meeting the specified demand and how much was siphoned off to other Canadian jurisdictions, i.e., provinces or leaked outside to foreign countries.
- Direct suppliers will in turn purchase goods and services from other industries as inputs. The model calculates the purchasing of these intermediate inputs to identify all the commodities

Section 2: Statistics Canada Input / Output Runs

and industry sectors that play a role in the production process of the initial supplier. This round of impacts is “indirect”.

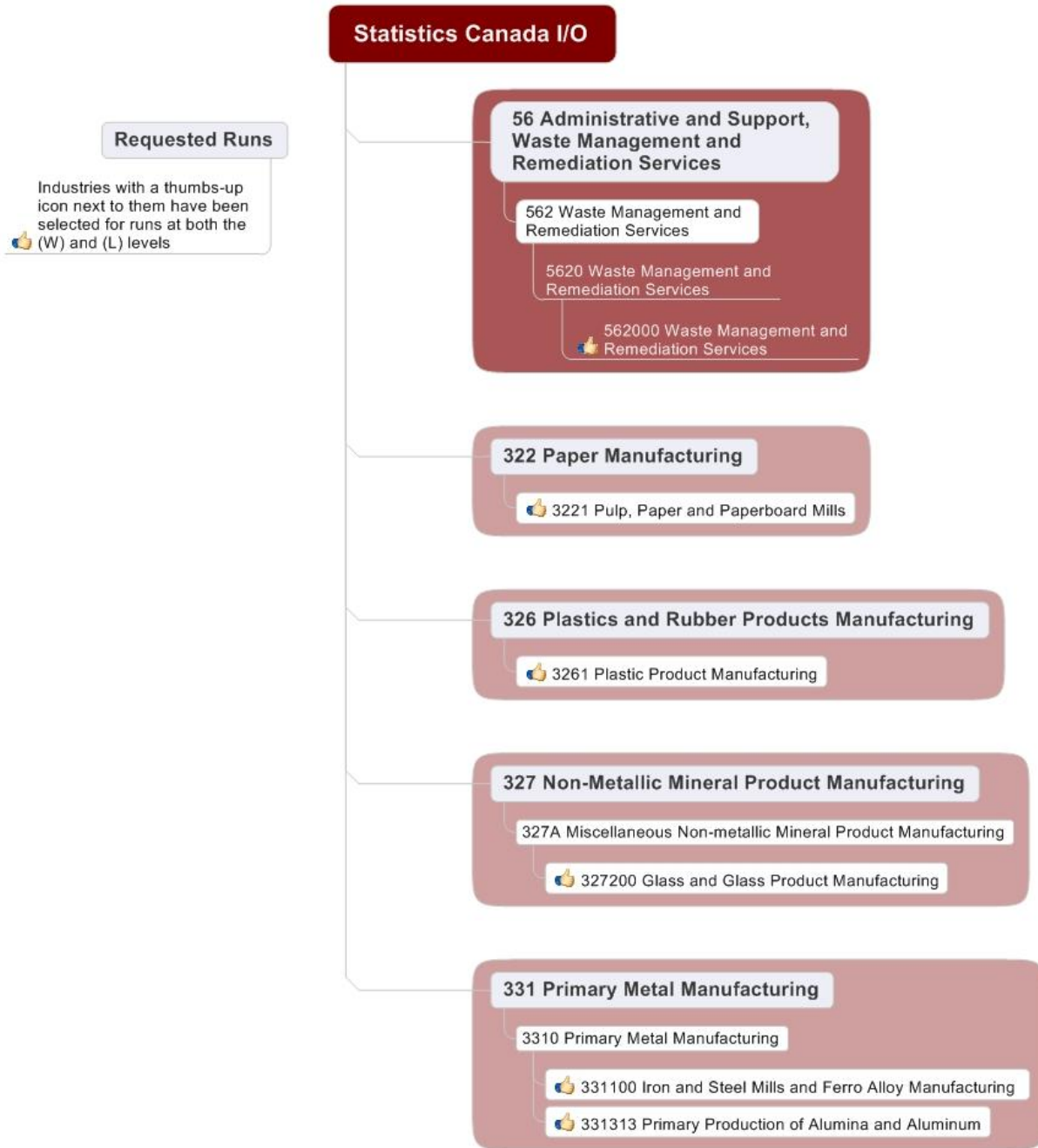
- The direct and indirect effects combine to form the total effects. The sum of the value added generated by the various industries at the direct and indirect levels represents the economy's overall production resulting from a given project or the activity of an industry, whose economic importance is to be evaluated.
- In addition to the above, the I/O Model can also be used to measure the spin-off effects due to the spending of income associated with employment created by a project or activity. This second round of effects is commonly referred to as induced effects. The latter are a measure of the economic consequences of consumer spending by direct and indirect employees for goods and services.
- The I/O Model calculates a number of multipliers and ratios: GDP, labour income, employment, gross output and taxes. Multipliers are factors of proportionality that measure the effect of one variable on another. For example \$1 million in gross output may result in \$1.3 million of GDP. The gross output to GDP multiplier is therefore 1.3. Different simulations using the model will produce multipliers of varying magnitudes depending on the importance of leakages (e.g. exports). The multipliers provide summary statistics of the economic impact of a given economic shock and can be used to predict economic impacts of expenditures or investments within a particular sector.
- It should be noted that taxes, in this report, refer to Federal (including trading profits on lottery and race tracks, gas, duty, air and goods and services taxes), Provincial (including gallon, trading profits, gas and amusement taxes as well as P.S.T and H.S.T) and Municipal (including amusement tax and M.S.T).
- Figure 2-1 depicts the value chain used to commission the Statistics Canada I/O Model runs.
- In Figure 2-1, the numbers preceding the industry sector are North American Industry Classifications (NAICs). The Blue Box program is a waste management activity captured under the W level code of 562000 Waste Management and Remediation Services. Commodities marketed out of the Blue Box flow downstream to other industry sectors namely:
 - Paper to 3221 Pulp, Paper and Paperboard Mills
 - Plastics to 3261 Plastic Product Manufacturing
 - Glass to 3272000 Glass and Glass Product Manufacturing
 - Steel to 331100 Iron and Steel Mills and Ferro Alloy Manufacturing
 - Aluminum to 331313 Primary Production of Alumina and Aluminum
- For each of the selected sectors the Statistics Canada I/O Model was shocked with a \$1 billion investment. This means that the I/O Model was calibrated and run with a \$1 billion input to gross investment. A variety of outputs and multipliers for sectors and commodities were then calculated by the model based on this calibration.
- The \$1 billion figure was used because it flushes out detail that might otherwise go unnoticed with a lesser shock value.

Section 2: Statistics Canada Input / Output Runs

- Since the model is a linear model, all the base multipliers generated for a specific industry sector shock are the same, no matter what the shock value is. Therefore, if a shock of \$100 in gross output yields \$130 of GDP (i.e. a multiplier of 1.3), then a \$1 shock in gross output using the multiplier of 1.3 would yield a GDP of \$1.30.
- The Statistics Canada Model I/O Model is an upstream model that when shocked calculates the impact on the sector specified and then all the upstream sectors that supply it. Therefore, adding the shock outputs (GDP, labour income, FTE jobs and gross output) together for a shock on the waste management and remediation sector and a separate shock to an upstream equipment manufacturing sector would result in some double counting. Conversely, shocking the waste management remediation sector and assuming that it would account for the economic consequences of commodity sales to downstream users would be false and would result in an under representation of economic consequences.
- Two other factors of note when using the Statistics Canada I/O Model are that it is a closed model (calculating only direct and indirect effects) and that where there are only a few companies representing a sector within a province the model results will not provide direct and indirect multipliers for confidentiality reasons.
- The Statistics Canada model is typically run as a closed I/O Model and thereby calculates direct and indirect effects but not induced. Some I/O models are run as open models and in this case they not only calculate direct and indirect effects, but also the induced effects attributable to labour income spending. Based on discussion with Statistics Canada, it was determined that the most appropriate way to derive induced multipliers for the study at hand was to shock the Statistics Canada I/O Model with a \$10 billion investment in personal expenditures within the Province of Ontario. This shock revealed the patterns of income spending relative to sectors and commodities and produced a set of multipliers. We subsequently applied these income multipliers against rounds of statistically decreasing income spending to calculate induced outputs and multipliers.
- Last, there were two industry sectors in the commissioned provincial runs that yielded zero direct and indirect values for confidentiality purposes when run at the provincial level. Statistics Canada does not present direct and results for sectors where the number of constituent firms is so low that individual identities could be deduced and results apportioned to specific firms. These were Pulp, Paper and Paperboard Mills, Manufacturing and Primary Production of Alumina and Aluminum. In order to develop direct and indirect multipliers for these sectors, again through discussion with Statistics Canada, national runs were commissioned for these sectors and then the results interpolated using both the national and provincial run results to calculate direct and indirect multipliers.

Section 2: Statistics Canada Input / Output Runs

Figure 2-1 Value chain used to commission Statistics Canada I/O Model runs



Source: AECOM 2009, based on Statistics Canada 1991

Section 3: The Blue Box Program

3. The Blue Box Program

3.1 Program Description

The Waste Diversion Act (WDA), passed in June 2002, created Waste Diversion Ontario (WDO), a multi-stakeholder non-government corporation. The WDO's mandate is to develop, implement and operate waste diversion programs for specific wastes, as requested by the Minister of the Environment (WDO 2009).

For each waste diversion program, WDO creates a sustainable funding model, based on fees paid by designated industry stewards. An Industry Funding Organization (IFO), set up for each program, helps WDO with this part of the process. Each waste diversion program includes rules for industry fees to be charged, estimated costs for the program, and waste diversion targets. As part of developing a program, WDO engages in a public consultation process.

There are presently three approved programs, Blue Box materials, Municipal Hazardous and Special Waste, and Waste Electrical and Electronic Equipment.

3.1.1 Blue Box Material

Stewardship Ontario is the IFO for the Blue Box program. Stewardship Ontario was formed in 2002 as the non-profit corporation representing the industries involved in the Blue Box program (see Table 3-1 for a list of Blue Box materials). Municipalities receive payments from Stewardship Ontario based on net program costs. Recycling program costs can include direct service delivery, public awareness and education, amortized capital, and indirect administration. Program revenue includes sales of blue box wastes, processing fees, sale of curbside containers, and other grants or funding.

Table 3-1 Designated Blue Box Materials

Blue Box Materials	Supplementary Blue Box Materials
<p>Newsprint</p> <p>Steel food and beverage containers FBC</p> <p>Glass bottles and jars for food or beverages</p> <p>Aluminum food or beverage cans</p> <p>PET bottles for food or beverages</p>	<p>Phone books</p> <p>Boxboard and paperboard</p> <p>Aluminum foil items</p> <p>Paper cups and plates</p> <p>Magazines</p> <p>Fine paper</p> <p>Rigid plastic containers</p> <p>Polystyrene food and beverage or packing material</p> <p>Cardboard</p> <p>Textiles</p> <p>Plastic film</p> <p>Polycoat food and beverage containers</p>

Source: Ministry of Environment 2004

Section 3: The Blue Box Program

Every year, municipalities in the program are required to report waste generation, diversion and cost data to WDO through the Municipal Datacall. The annual WDO Municipal Datacall is used to calculate funding to municipalities and the stewards' contribution. Penalties for late submissions to the Datacall are also deducted from the funding provided by the WDO. In the near future, it is expected that the funding model will be adapted to best practices developed by the WDO. In 2007, 206 Ontario Municipalities were listed in the Datacall.

Also under the Blue Box program, a portion of the IFO contribution is set aside for improving the Blue Box material capture and program efficiency. The Continuous Improvement Fund (CIF) has been set up to replace the Efficiency and Effectiveness (E&E) Fund, which has been providing funding to municipalities since 2004. The CIF will be used to identify best practices in Blue Box material diversion and provide financial support to municipalities through either grants or loans in implementing those best practices.

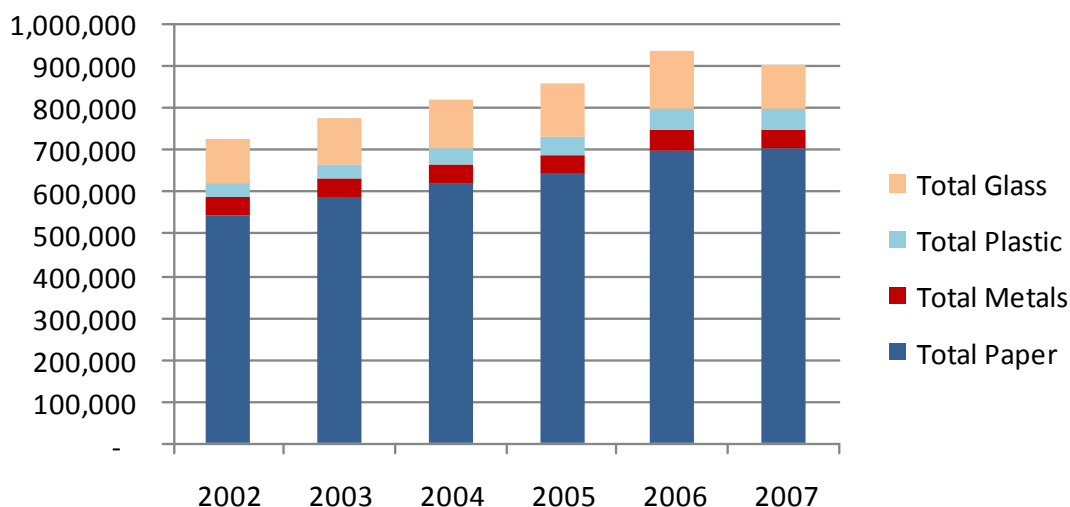
3.2 Historic Trends

3.2.1 Tonnes Marketed

- The Blue Box program has a comprehensive data set derived from the Municipal Datacall annually administered by Waste Diversion Ontario.
- Figure 3-1 and Table 3-2 set out the tonnes of Blue Box material annually marketed over the 2002 to 2007 period.
- Between 2002 and 2007, the volume of material marketed grew at an average annual compound rate of approximately 1%, which is very close to the provincial rate for population growth over the same period.
- This trend seems to be indicative of a mature program with growth correlated to increases in population as opposed to increases in commodity capture per capita.
- The major commodity marketed by volume is paper followed by glass, plastics and metals.
- Between 2006 and 2007, there was a slight downturn in the quantity of materials marketed. Observation of the statistics in Table 3-2 discloses a marked fall in the volume of glass. This may be attributable to the advent of the bottle return program sponsored by the Liquor Control Board of Ontario. Other commodity declines are relatively minor and may be attributable to minor shifts in market demand.

Section 3: The Blue Box Program

Figure 3-1 Blue Box Tonnes Marketed (2002 - 2007)



Source: WDO, 2009a

Table 3-2 Blue Box Tonnes Marketed (2002 – 2007)

		2002	2003	2004	2005	2006	2007
Paper	Printed Paper	409,754	430,614	451,501	456,519	498,845	500,083
	Paper Packaging	133,740	155,411	166,356	183,617	198,874	200,231
	Polycoat	1,240	1,491	1,993	2,568	2,731	2,876
	Total Paper	544,734	587,516	619,850	642,704	700,450	703,190
Metals	Aluminum	10,776	10,113	10,754	11,152	11,629	10,829
	Steel	33,472	32,583	33,544	33,638	34,754	34,066
	Total Metals	44,248	42,696	44,298	44,790	46,383	44,895
Plastic	PET	15,176	16,087	20,143	23,515	27,205	27,116
	HDPE	8,541	9,809	12,133	13,328	15,272	15,201
	Film	-	-	-	-	3,515	4,822
	Tubs & Lids	-	-	-	-	3,613	2,820
	Polystyrene	-	-	-	-	847	417
	Mixed	8,211	9,486	7,527	9,240	1,040	2,825
	Total Plastic	31,928	35,382	39,803	46,083	51,492	53,201
Glass	Flint	26,809	27,138	28,009	23,045	18,435	11,800
	Coloured	10,045	7,448	20,709	15,938	12,566	6,767
	Mixed	69,243	79,663	70,966	88,753	108,653	82,645
	Total Glass	106,097	114,249	119,684	127,736	139,654	101,212
Sum of Commodities		727,007	779,843	823,635	861,313	937,979	902,498

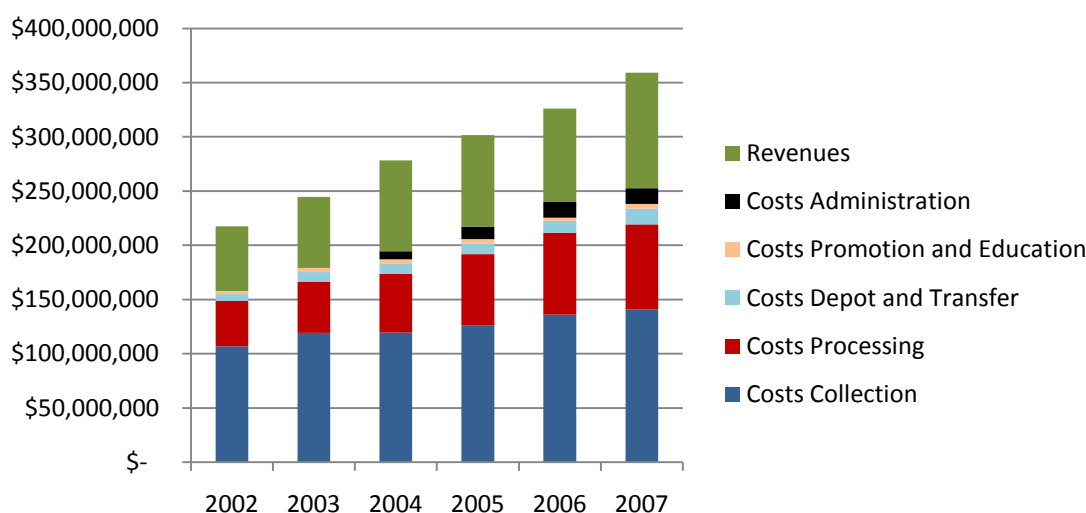
Source: WDO, 2009a

Section 3: The Blue Box Program

3.2.2 System Costs and Revenues

- Both system costs (gross) and revenues associated with the Blue Box program show increases over the 2002 to 2007 time frame (Figure 3-2 and Table 3-3).
- In 2007, gross costs were in the order of \$253 million and revenues were roughly 42% of these costs, at \$107 million.
- Among gross system costs, collection was the dominant cost category at 56% followed by processing at 31%. Depot and transfer, and administration each accounted for 6% of the costs, and promotion and education accounted for the remaining 2%.
- Both costs and revenues have grown at a very similar rate over the period reflecting a steady and consistent gap between the two.

Figure 3-2 Blue Box System Costs and Revenues (2002 – 2007)



Source: WDO, 2009b

Table 3-3 Blue Box System Costs and Revenues (2002-2007)

		2002	2003	2004	2005	2006	2007
Costs	Collection	\$ 106,902,159	\$ 119,217,232	\$ 119,452,024	\$ 126,172,998	\$ 136,183,678	\$ 140,900,411
	Processing	\$ 41,826,575	\$ 46,992,418	\$ 53,969,590	\$ 65,607,588	\$ 75,281,982	\$ 78,372,822
	Depot and Transfer	\$ 6,116,900	\$ 9,027,665	\$ 9,838,762	\$ 9,809,938	\$ 11,047,601	\$ 14,328,415
	Promotion and Education	\$ 2,990,027	\$ 3,889,637	\$ 3,763,081	\$ 4,205,695	\$ 3,075,621	\$ 4,671,703
	Administration	\$ -	\$ -	\$ 7,527,745	\$ 11,451,327	\$ 14,349,563	\$ 14,274,120
	Total Costs	\$ 157,835,661	\$ 179,126,952	\$ 194,551,202	\$ 217,247,546	\$ 239,938,445	\$ 252,547,471
Revenues		\$ 59,754,371	\$ 65,601,658	\$ 83,755,844	\$ 84,201,706	\$ 86,211,323	\$ 106,642,942
Total Costs and Revenues		\$ 217,590,032	\$ 244,728,610	\$ 278,307,046	\$ 301,449,252	\$ 326,149,768	\$ 359,190,413

Source: WDO, 2009b

Section 3: The Blue Box Program

3.3 Economic Impacts

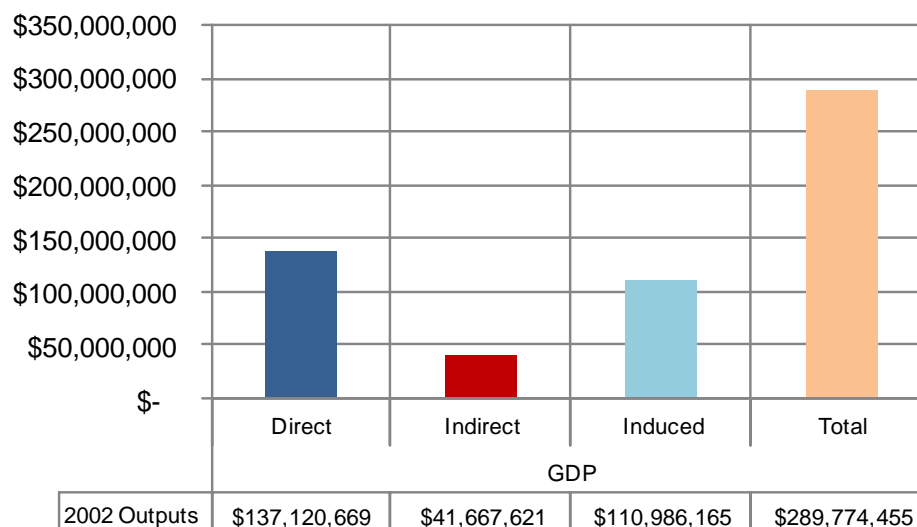
3.3.1 Blue Box and Upstream Economic Impacts (2002)

The economic impacts of the Blue Box program are driven by total economic outputs (costs plus revenues).

- In 2002, the economic output of the Blue Box program, which equated to total costs and revenues was \$218 million (Table 3-3).
- This economic output generated significant direct, indirect and induced effects in the Province of Ontario across other economic dimensions.
- The Gross Domestic Product (GDP) impact was \$290 million and of this sum, 29% was attributable to direct effects, 14% to indirect effects and 38% attributable to induced income spending by direct and indirect labour (Figure 3-3).
- Labour Income generated from the Blue Box Program totalled \$145 million and of this sum, 37% was accounted for by direct employment, 19% by indirect employment and 44% by induced employment (Figure 3-4).
- The 2002 Blue Box program created 2,953 FTE jobs in the Ontario economy. (Figure 3-5)
- Of this total number of jobs, 1,034 FTE jobs were directly created in the Waste Management and Remediation sector and 553 FTE jobs were created in upstream businesses that supply the sector.
- Close to 1,370 additional induced FTE jobs were also created in the economy through the income spending of direct and indirect employees
- Total Gross Output amounted to \$481 million and of this sum, the direct portion accounted for 45%, indirect for 16% and induced for 38% (Figure 3-6).
- In 2002, each tonne of Blue Box material marketed created approximately: \$400 of total GDP, \$200 of total labour income and \$660 of Gross Output.
- In 2002, approximately .004 jobs were created for each tonne of Blue Box material marketed.
- Tax revenues spawned by the 2002 Blue Box program totalled \$17.8 million (Figure 3-7).
- Federal coffers received, \$6.3 million, provincial coffers \$11.4 million and municipal coffers approximately \$17,000.
- In 2002, each tonne of Blue Box material marketed created approximately \$8.71 of federal taxes, \$15.71 of provincial taxes and \$0.01 of municipal taxes.

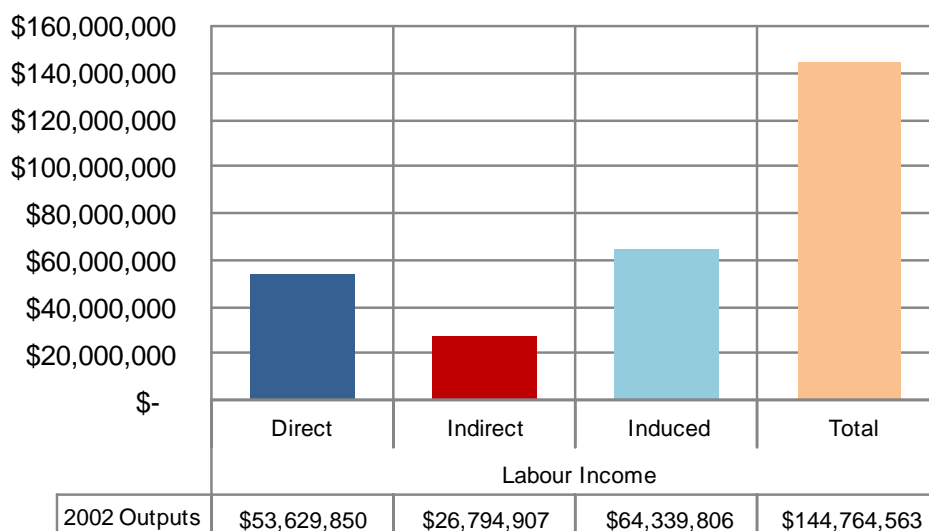
Section 3: The Blue Box Program

Figure 3-3 Blue Box Economic Outputs – GDP (2002)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

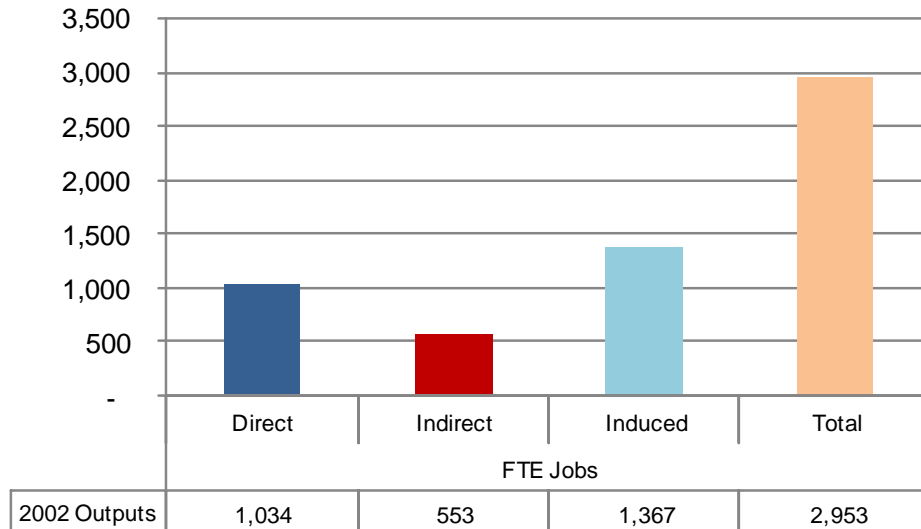
Figure 3-4 Blue Box Economic Outputs – Labour Income (2002)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

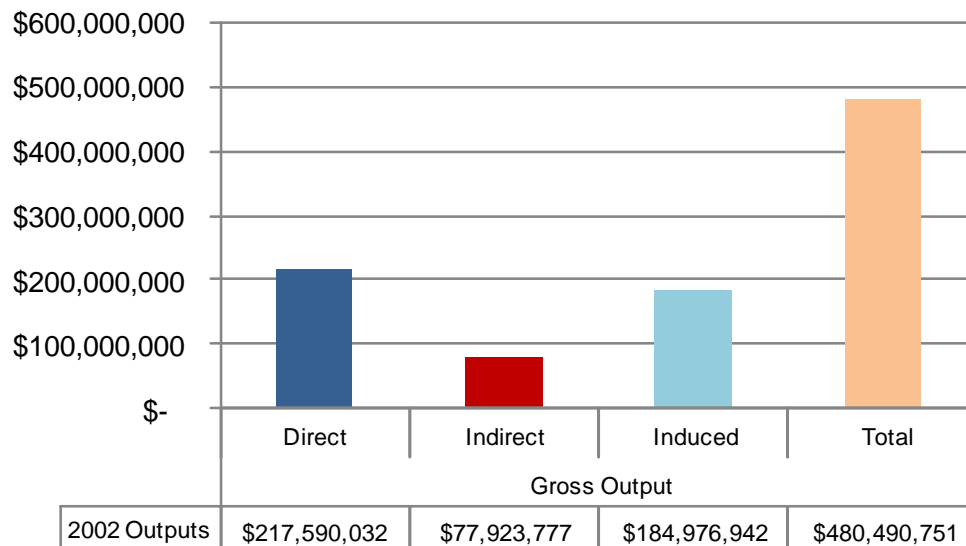
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Figure 3-5 Blue Box Economic Outputs – FTE Jobs (2002)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

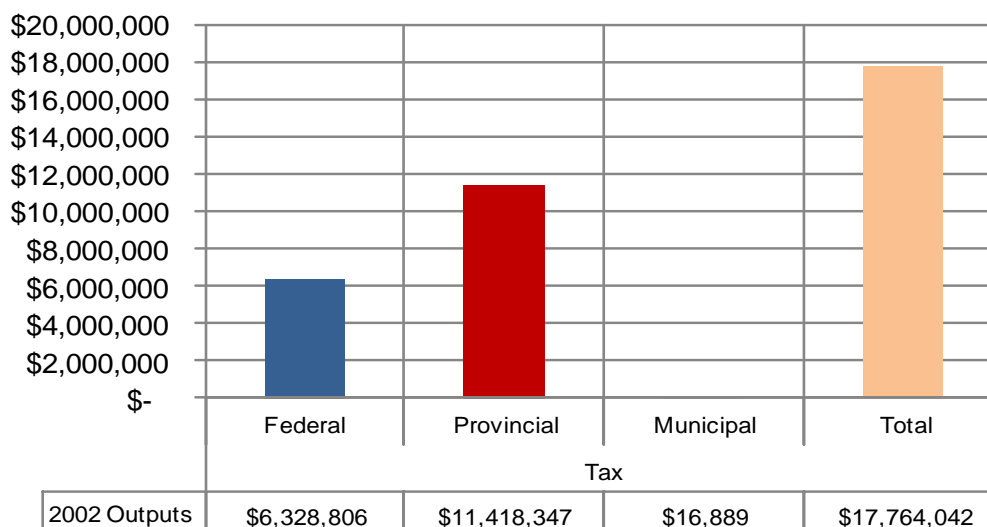
Figure 3-6 Blue Box Economic Outputs – Gross Output (2002)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

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Figure 3-7 Blue Box Economic Outputs – Taxes (2002)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

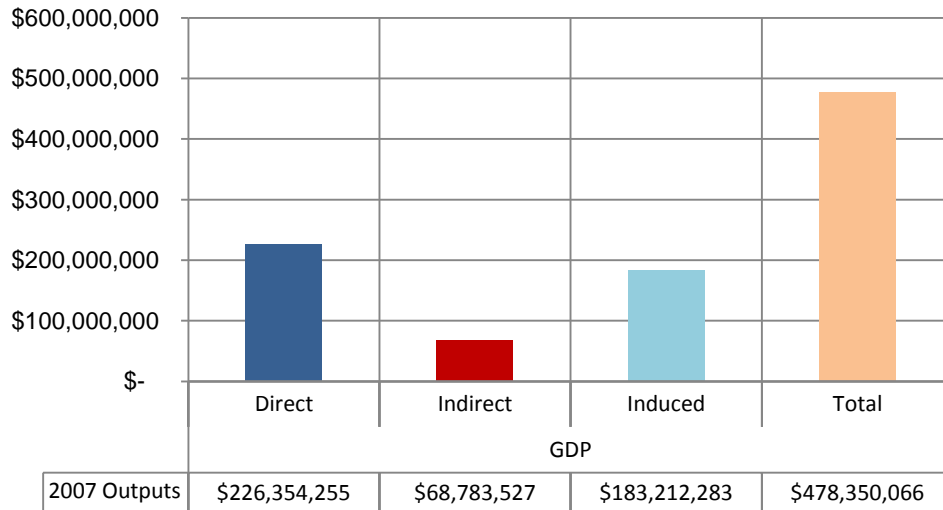
3.3.2 Blue Box and Upstream Economic Impacts (2007)

- In 2007, the economic output of the Blue Box program, which equated to total costs and revenues was \$359 million (Table 3-3).
- This economic output generated significant direct, indirect and induced effects in the Province of Ontario across other economic dimensions.
- The Gross Domestic Product (GDP) impact was \$478 million and of this sum, 47% was attributable to direct effects, 14% to indirect effects and 38% attributable to induced income spending by direct and indirect labour (Figure 3-8).
- Labour Income totalled \$239 million and of this sum, 37% was accounted for by direct employment, 19% by indirect employment and 44% by induced employment (Figure 3-9).
- The 2007 Blue box program created 4,875 FTE jobs in the Ontario economy (Figure 3-10).
- Of this total number of jobs, 1,706 FTE jobs were directly created in the Waste Management and Remediation sector and 912 FTE jobs were created in upstream businesses that supply the sector.
- Just over 2,250 additional induced FTE jobs were also created in the economy through the income spending of direct and indirect employees.
- Total Gross Output amounted to \$793 million and of this sum, the direct portion accounted for 45%, indirect for 16% and induced for 38% (Figure 3-11).

Section 3: The Blue Box Program

- In 2007, each tonne of Blue Box material marketed created approximately: \$530 of total GDP, \$265 of total labour income and \$880 of Gross Output.
- In 2007, approximately .005 jobs were created for each tonne of Blue Box material marketed.
- Tax revenues spawned by the 2007 Blue Box Program totalled \$29.3 million (Figure 3-12).
- Federal coffers received, \$10.5 million, provincial coffers \$18.9 million and municipal coffers approximately \$28,000.
- In 2007, each tonne of Blue Box material marketed created approximately: \$12 of federal taxes, \$21 of provincial taxes and \$0.03 of municipal taxes.

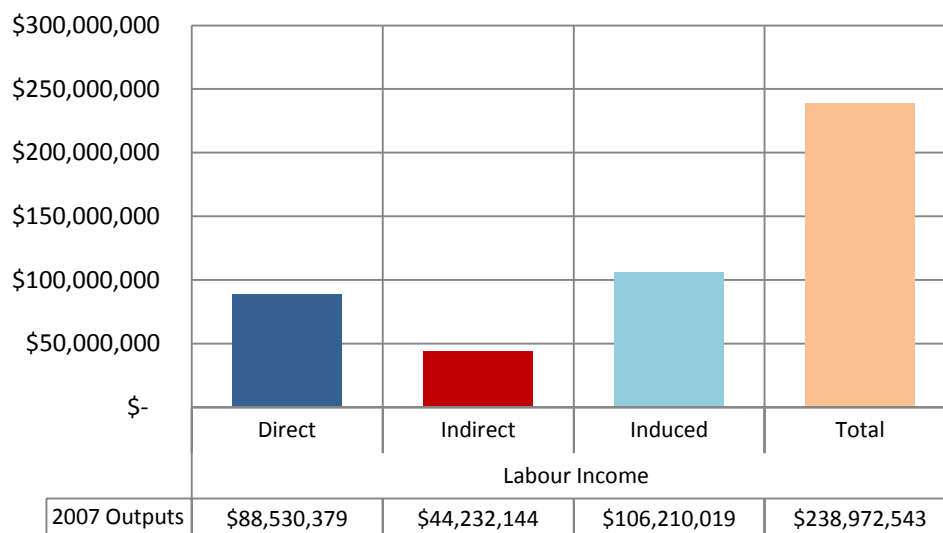
Figure 3-8 Blue Box Economic Outputs – GDP (2007)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

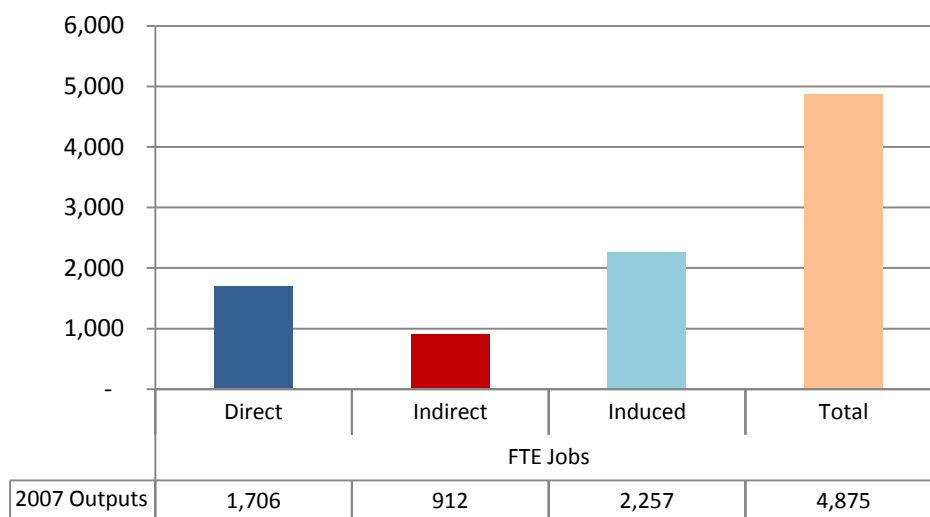
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Figure 3-9 Blue Box Economic Outputs – Labour Income (2007)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

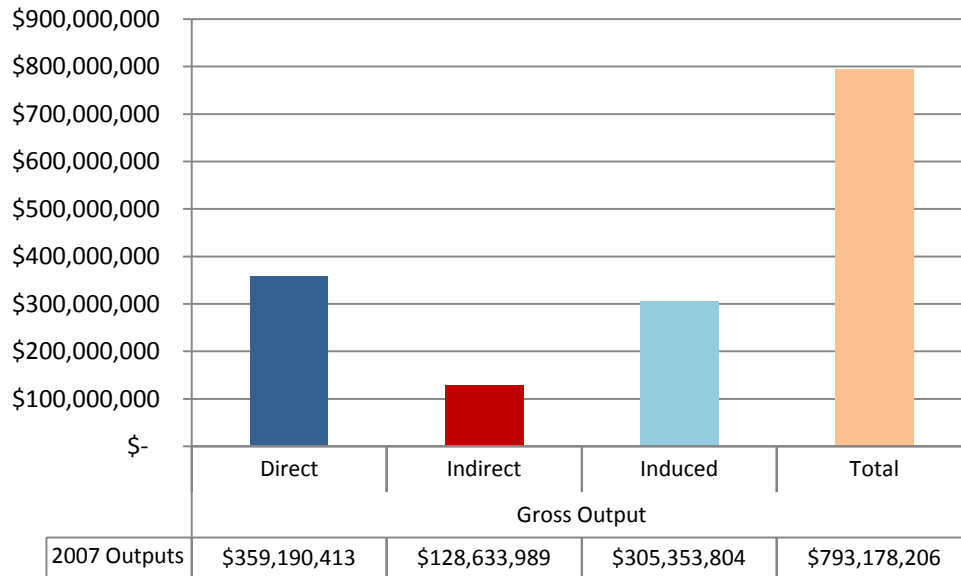
Figure 3-10 Blue Economic Box Outputs – FTE Jobs (2007)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

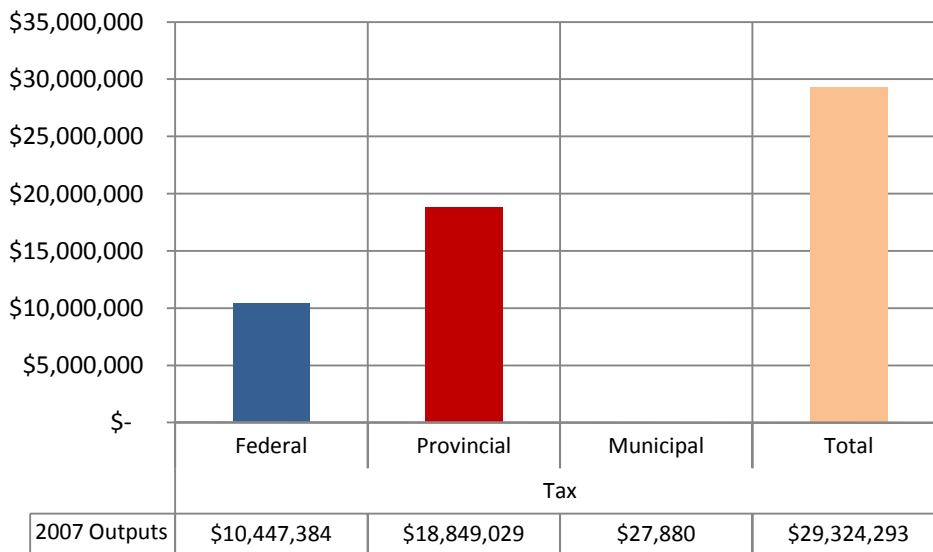
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Figure 3-11 Blue Box Economic Outputs – Gross Output (2007)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

Figure 3-12 Blue Box Economic Outputs – Taxes (2007)



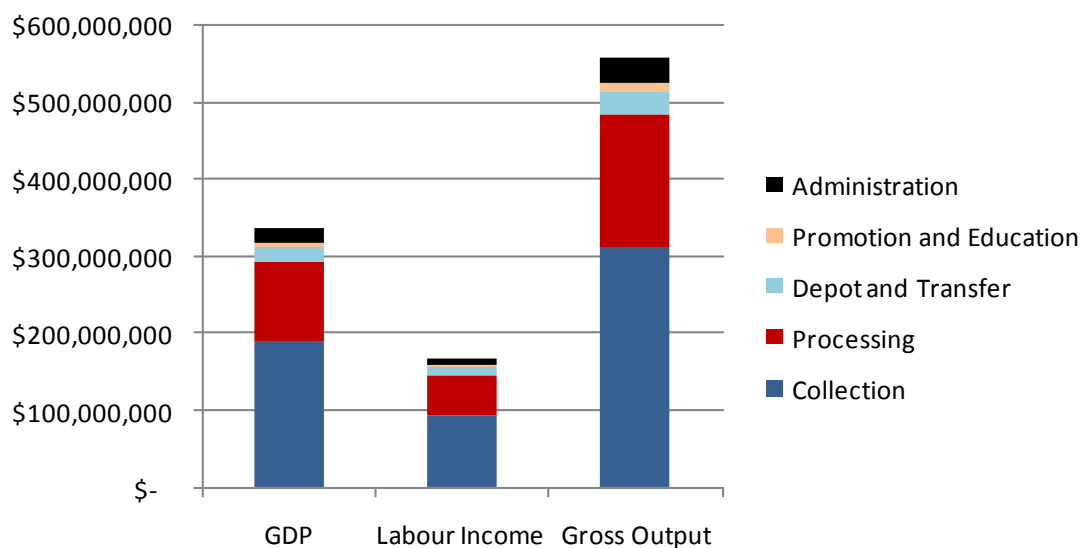
Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

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In the figures and table that follow (Figures 3-13, 3-14 and Table 3-4) a breakdown of system components within the Blue Box program reveals the economic contributions of each component to the provincial economy in 2007.

- Collection is the dominant activity, generating approximately \$188 million in GDP, \$94 million in labour income, and \$311 million in Gross Output. It also creates 1,913 FTE jobs.
- Processing is the second major activity, accounting for \$104 million in GDP, \$52 million in labour income and \$173 million in Gross Output. FTE job creation for this activity totals 1,064.
- Depot and Transfer, and Administration are very similar in economic outputs with each roughly accounting for \$19 million in GDP, \$9.5 million in labour income and \$31.5 million in Gross Output. Each creates about 190 FTE jobs.
- Promotion and Education creates \$6.2 million in GDP, \$3.1 million in labour income, and \$10.3 million in Gross Output. Job creation is in the order of 60 FTE jobs.

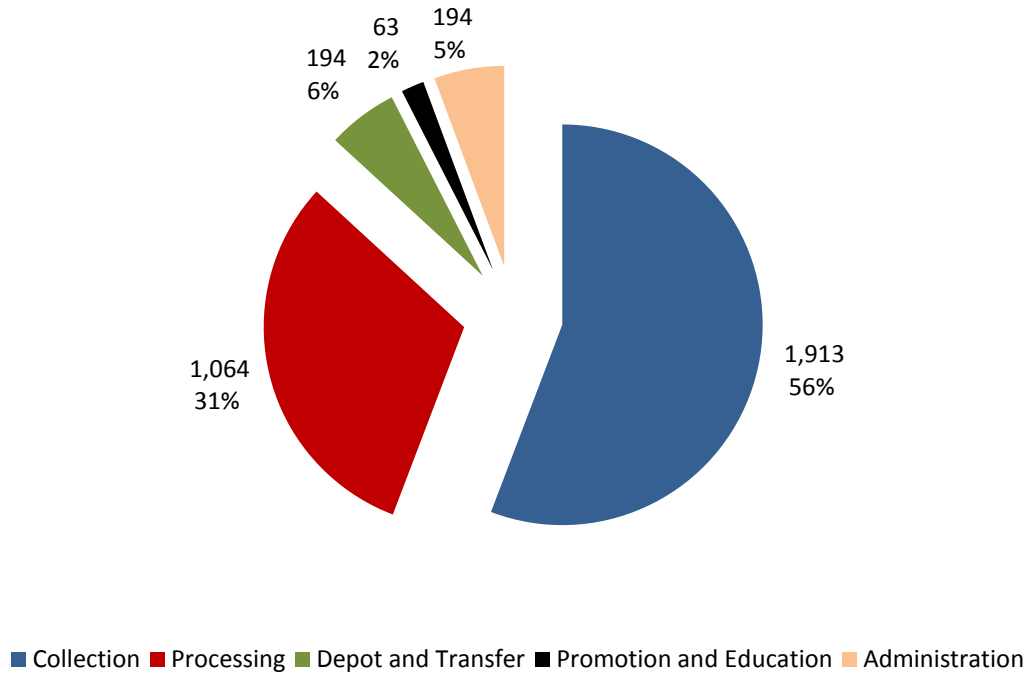
Figure 3-13 Blue Box Economic Outputs – GDP, Labour Income, and Gross Output (2007)



Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

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Figure 3-14 Waste Management and Remediation Sector Blue Box System Outputs – FTE Jobs (2007)



Source: AECOM, 2009, Based on WDO, 2007 and Statistics Canada, 2009

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Table 3-4 Waste Management and Remediation Sector Blue Box System Outputs - 2007

		Costs							
		Collection	Processing	Depot and Transfer	Promotion and Education	Administration	Total costs	Revenues	Costs_Revenues
GDP	Direct	\$ 88,792,480	\$ 49,388,907	\$ 9,029,466	\$ 2,944,009	\$ 8,995,251	\$ 159,150,113	\$ 67,204,143	\$ 226,354,255
	Indirect	\$ 26,981,865	\$ 15,008,082	\$ 2,743,834	\$ 894,612	\$ 2,733,437	\$ 48,361,831	\$ 20,421,697	\$ 68,783,527
	Induced	\$ 71,869,084	\$ 39,975,632	\$ 7,308,496	\$ 2,382,896	\$ 7,280,802	\$ 128,816,909	\$ 54,395,374	\$ 183,212,283
	Total	\$ 187,643,429	\$ 104,372,620	\$ 19,081,796	\$ 6,221,517	\$ 19,009,489	\$ 336,328,852	\$ 142,021,213	\$ 478,350,065
Income	Direct	\$ 34,728,006	\$ 19,316,706	\$ 3,531,553	\$ 1,151,444	\$ 3,518,171	\$ 62,245,880	\$ 26,284,499	\$ 88,530,379
	Indirect	\$ 17,351,040	\$ 9,651,143	\$ 1,764,458	\$ 575,292	\$ 1,757,772	\$ 31,099,706	\$ 13,132,438	\$ 44,232,144
	Induced	\$ 41,663,237	\$ 23,174,279	\$ 4,236,809	\$ 1,381,389	\$ 4,220,755	\$ 74,676,469	\$ 31,533,550	\$ 106,210,019
	Total	\$ 93,742,283	\$ 52,142,128	\$ 9,532,821	\$ 3,108,125	\$ 9,496,698	\$ 168,022,055	\$ 70,950,488	\$ 238,972,543
Jobs	Direct	669	372	68	22	68	1,200	507	1,706
	Indirect	358	199	36	12	36	641	271	912
	Induced	885	492	90	29	90	1,587	670	2,257
	Total	1,913	1,064	194	63	194	3,428	1,448	4,875
Gross Output	Direct	\$ 140,900,411	\$ 78,372,822	\$ 14,328,415	\$ 4,671,703	\$ 14,274,120	\$ 252,547,471	\$ 106,642,942	\$ 359,190,413
	Indirect	\$ 50,459,537	\$ 28,067,032	\$ 5,131,321	\$ 1,673,040	\$ 5,111,876	\$ 90,442,805	\$ 38,191,184	\$ 128,633,989
	Induced	\$ 119,781,807	\$ 66,626,053	\$ 12,180,826	\$ 3,971,493	\$ 12,134,669	\$ 214,694,848	\$ 90,658,957	\$ 305,353,804
	Total	\$ 311,141,755	\$ 173,065,906	\$ 31,640,562	\$ 10,316,236	\$ 31,520,666	\$ 557,685,124	\$ 235,493,082	\$ 793,178,207

Source: AECOM, 2009, Based on WDO, 2009b and Statistics Canada, 2009

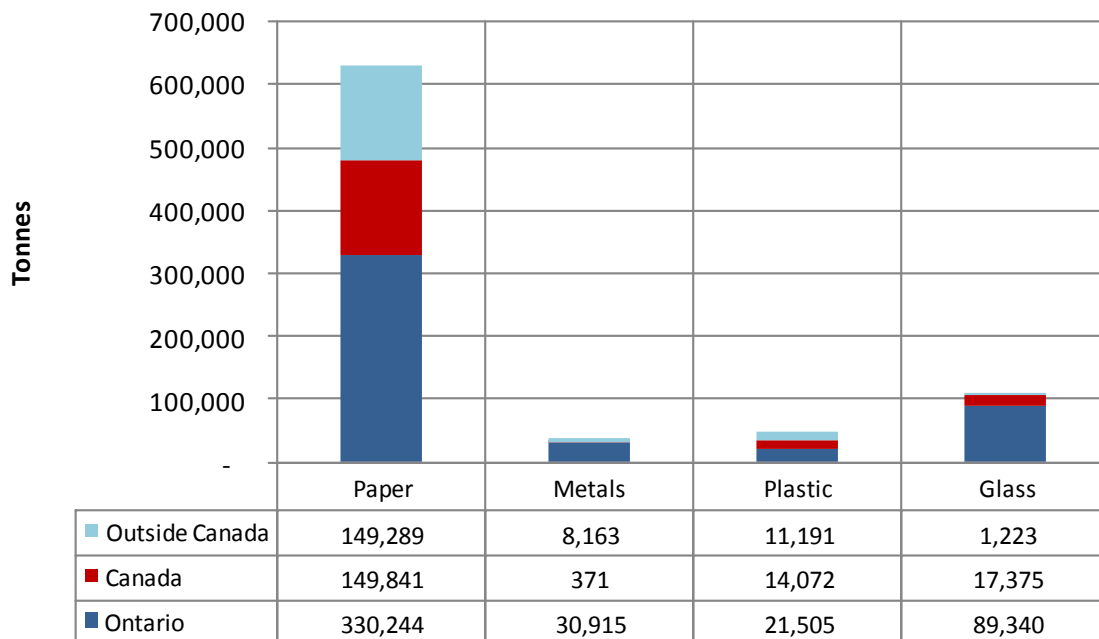
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3.3.3 2007 Blue Box Commodity Flows

The Blue Box program generates four general commodity groups that flow to a variety of market places and end users.

- Based on the 2007 WDO report, “Disposition of Blue Box Materials” (WDO, 2007) the geographic destination of 2004 Blue Box materials (823,529 tonnes) is reflected in Figure 3-15.
- Within the Canada and Ontario some of the materials flow directly to five end use industrial sectors (Figure 3-16).

Figure 3-15 Blue Box Commodity Flows to Market Geographies



Source: WDO, 2007

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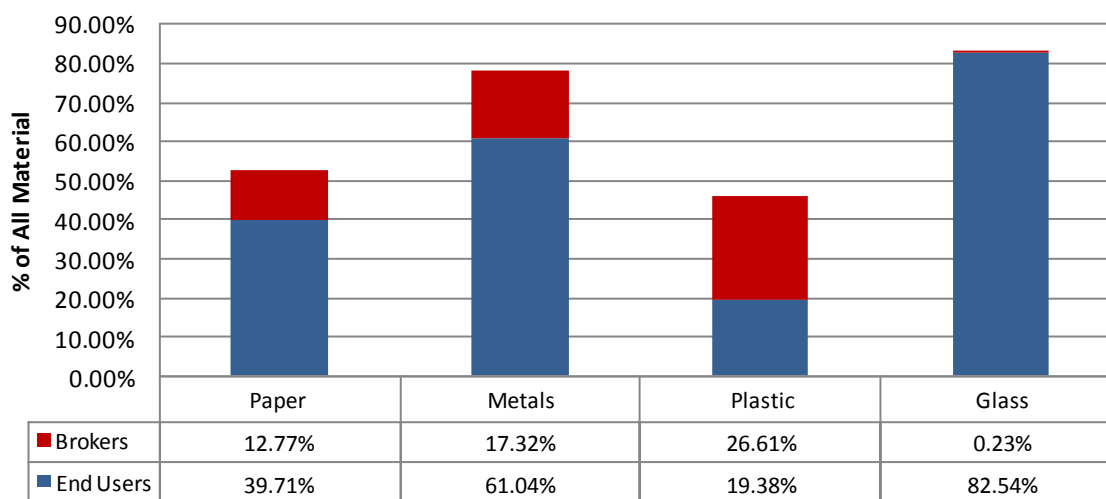
Figure 3-16 Blue Box Industrial Sector End Markets in Ontario and Canada



Source: AECOM, 2009

- However, a significant portion of the Blue Box tonnage moves to brokers who in turn resell the material to end users both at home and abroad.
- The WDO (2007) study identifies end users and brokers by geography but it does not trace material flows from brokers to end users.
- Figure 3-17 illustrates the percentage flow of Blue Box materials to brokers and end users in Ontario.

Figure 3-17 Blue Box Commodity Flows to Ontario Brokers and End Users



Source: WDO, 2007

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- Of the marketable commodity tonnages generated by the Blue Box program approximately 40% of paper, 60% of metals, 20% of plastics and 80% of glass flow directly to end users within the Province of Ontario.
- In the case of metals there is a profound difference between the flow of steel and aluminum. Approximately 80% of Blue Box steel moves directly to end users within the province, while the corresponding statistic for aluminum is below 10%.
- An examination of broker flows reveals that 13% of paper, 17% of metals, 27% of plastic and a fraction of percent of glass flow to Ontario brokers. In the case of Blue Box steel and aluminum specifically, 21% of steel and 5% of aluminum move to Ontario brokers.
- Beyond brokers, the market paths are uncharted with respect to final destinations. At the moment there does not appear to be any readily available data that tracks the movement of Blue Box materials onward. Calls to brokers themselves proved to be inconclusive. There was a strong reluctance among those contacted to reveal the identity of forwarding destinations and customers.
- For the purposes of this study at the moment we have made the assumption that Ontario brokers forward 50% of their materials to end users within the province and the balance to end users outside the province.

For the purposes of this study at the moment we have made the assumption that Ontario brokers forward 50% of their materials to end users within the province and the balance to end users outside the Province.

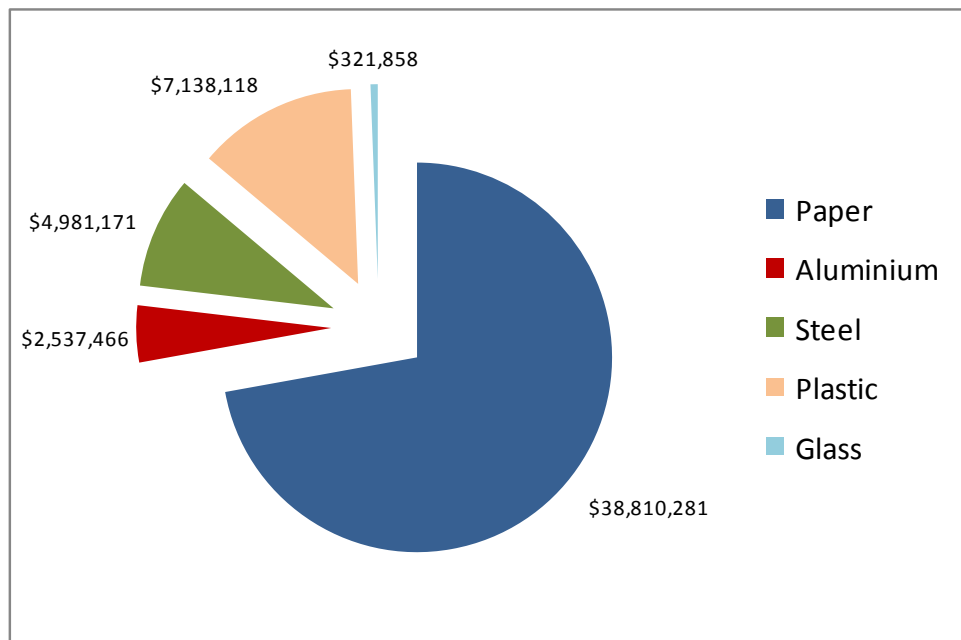
3.3.4 2007 Downstream Economic Impacts

The estimated economic value of Blue Box commodities flowing directly and indirectly to end producers in Ontario in 2007 is set out in Figure 3-18.

- The dominant commodity is paper with a sale value in the order of \$39 million. Plastics follow at \$7million and then steel and aluminum at \$5 million and \$2.5 million, respectively. Although significant tonnage of glass flows to end users in Ontario, the value of this material is quite low, in the order \$320,000.

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Figure 3-18 Value of Blue Box Commodity Flows to End Use Industry Sectors in Ontario (2007)

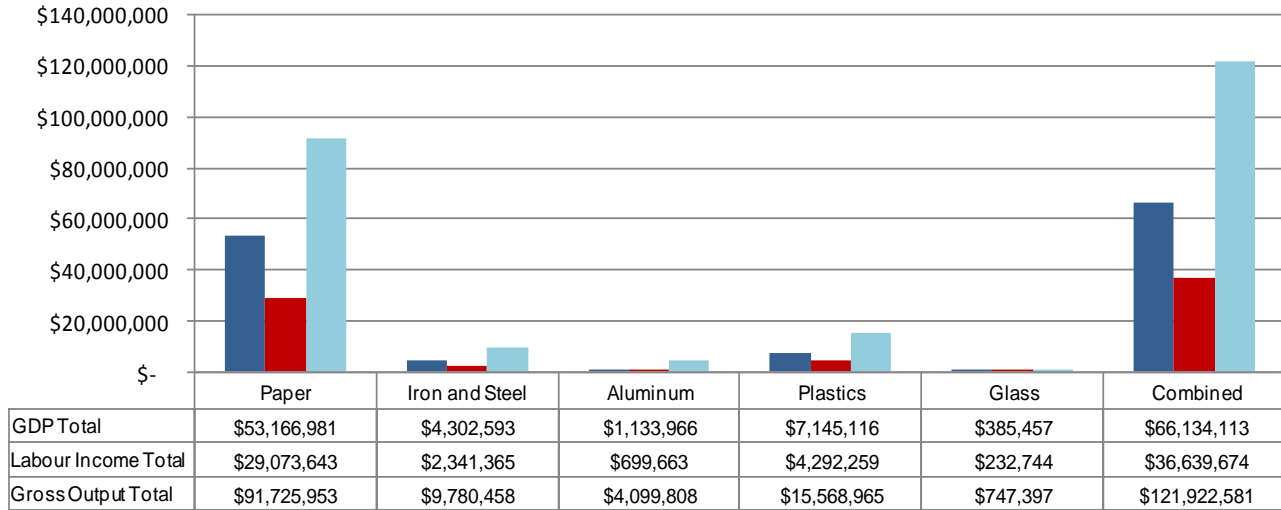


Source: WDO, 2007

The economic effects of these 2007 commodity inputs on recipient industry sectors are depicted in Figures 3-19 to 3-21 and Table 3-5.

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Figure 3-19 Economic Outputs from Blue Box Downstream Sectors (2007) – GDP, Income and Gross Output

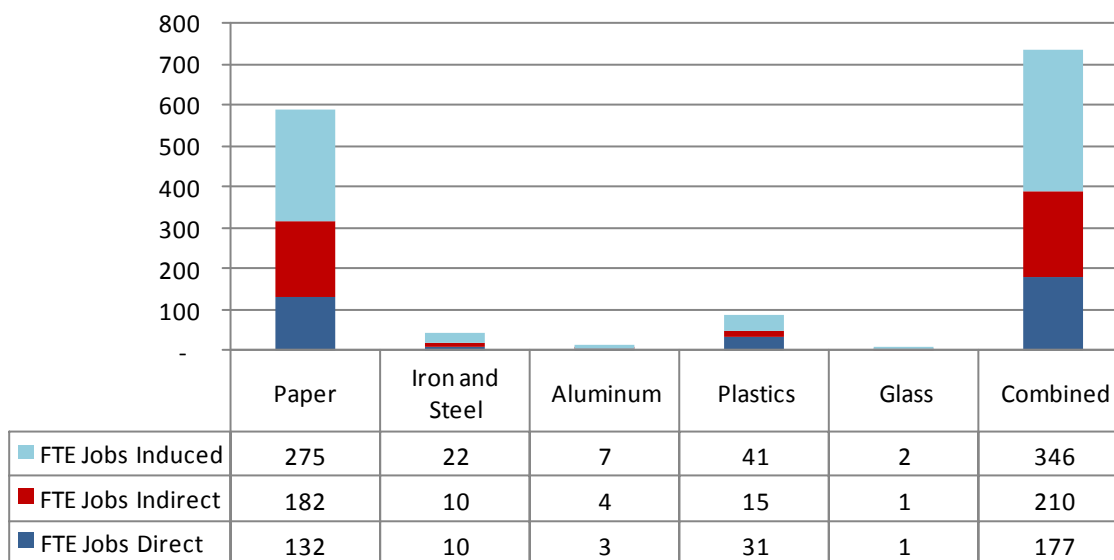


Source: AECOM 2009, Based on WDO, 2007 and Statistics Canada, 2009

- Among the downstream industry sectors that purchase Blue Box material the paper manufacturing sector generates the largest co-related economic output. Plastics is second followed by iron and steel, aluminum and then glass. All sectors combined taking into account direct, indirect and induced effects generate about \$66 million in GDP, \$37 million in labour income and \$121 million in Gross Output within the Ontario economy.
- The FTE job creation generated by the downstream industry sectors amounts to 734 jobs. The key sector is paper manufacturing with 589 jobs followed by plastics with 86. Iron and steel manufacturing generates 41 jobs, aluminum 13 and glass 4.
- The taxes generated by downstream industries total approximately \$4.7 million. The federal capture is just under \$2.0 million, the provincial capture is \$2.7 million and the municipal capture is minimal at approximately \$5,000.

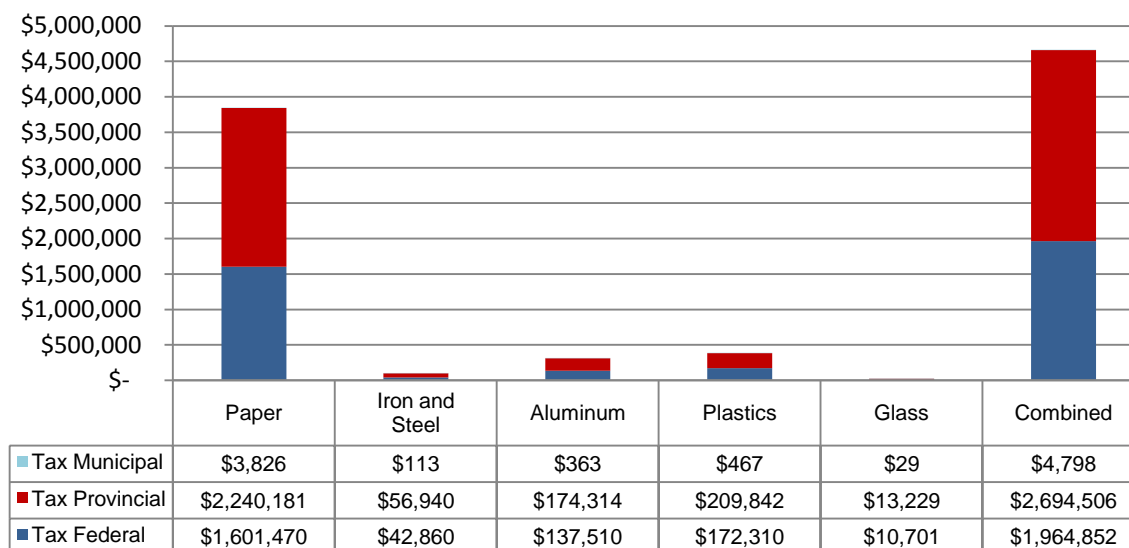
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Figure 3-20 Economic Outputs from Blue Box Downstream Sectors– Jobs (2007)



Source: AECOM 2009, Based on WDO, 2007 and Statistics Canada, 2009

Figure 3-21 Economic Outputs from Blue Box Downstream Sectors - Taxes (2007)



Source: AECOM, 2009, Based on WDO, 2007 and Statistics Canada, 2009

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Table 3-5 Economic Outputs from Blue Box Downstream Sectors (2007)

		Paper	Iron and Steel	Aluminum	Plastics	Glass	Combined
GDP	Direct	\$ 13,099,751	\$ 1,617,780	\$ 253,516	\$ 2,545,424	\$ 144,200	\$ 17,660,671
	Indirect	\$ 17,777,437	\$ 889,767	\$ 344,042	\$ 1,308,960	\$ 62,820	\$ 20,383,026
	Induced	\$ 22,289,793	\$ 1,795,046	\$ 536,408	\$ 3,290,732	\$ 178,437	\$ 28,090,417
	Total	\$ 53,166,981	\$ 4,302,593	\$ 1,133,966	\$ 7,145,116	\$ 385,457	\$ 66,134,113
Labour Income	Direct	\$ 7,717,269	\$ 771,300	\$ 185,717	\$ 1,573,391	\$ 92,551	\$ 10,340,228
	Indirect	\$ 8,434,755	\$ 529,459	\$ 202,985	\$ 811,197	\$ 36,752	\$ 10,015,147
	Induced	\$ 12,921,619	\$ 1,040,607	\$ 310,961	\$ 1,907,671	\$ 103,442	\$ 16,284,300
	Total	\$ 29,073,643	\$ 2,341,365	\$ 699,663	\$ 4,292,259	\$ 232,744	\$ 36,639,674
FTE Jobs	Direct	132	10	3	31	1	177
	Indirect	182	10	4	15	1	210
	Induced	275	22	7	41	2	346
	Total Jobs	589	41	13	86	4	734
Gross Output	Direct	\$ 38,810,281	\$ 4,981,171	\$ 2,537,466	\$ 7,138,118	\$ 321,858	\$ 53,788,895
	Indirect	\$ 15,766,017	\$ 1,807,543	\$ 668,328	\$ 2,946,294	\$ 128,144	\$ 21,316,325
	Induced	\$ 37,149,655	\$ 2,991,744	\$ 894,014	\$ 5,484,553	\$ 297,395	\$ 46,817,361
	Total	\$ 91,725,953	\$ 9,780,458	\$ 4,099,808	\$ 15,568,965	\$ 747,397	\$ 121,922,581
Tax	Federal	\$ 1,601,470	\$ 42,860	\$ 137,510	\$ 172,310	\$ 10,701	\$ 1,964,852
	Provincial	\$ 2,240,181	\$ 56,940	\$ 174,314	\$ 209,842	\$ 13,229	\$ 2,694,506
	Municipal	\$ 3,826	\$ 113	\$ 363	\$ 467	\$ 29	\$ 4,798
	Total Tax	\$ 3,845,478	\$ 99,913	\$ 312,187	\$ 382,619	\$ 23,959	\$ 4,664,156

Source: AECOM, 2009, Based on WDO, 2007 and Statistics Canada, 2009

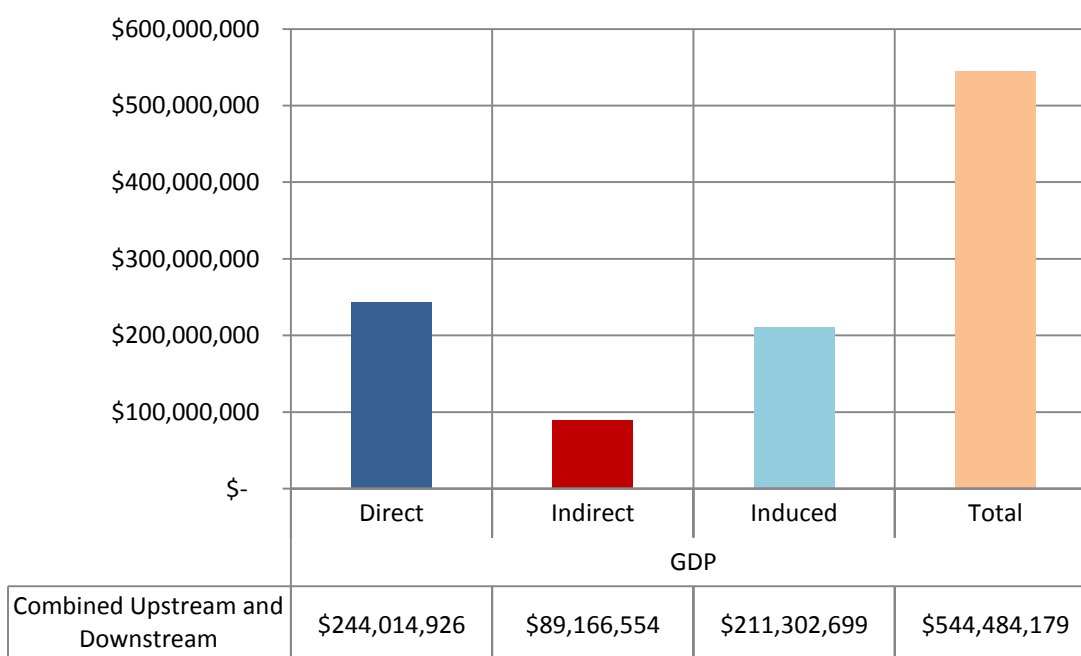
3.3.5 2007 Combined Upstream and Downstream Economic Impacts

- In 2007, the economic output of the upstream and downstream sectors associated with the Blue Box program was \$413 million.
- The Gross Domestic Product (GDP) impact was \$545 million and of this sum, 45% was attributable to direct effects, 16% to indirect effects and 39% attributable to induced income spending by direct and indirect labour (Figure 3-22).
- Labour Income totalled \$275 million and of this sum, 35% was accounted for by direct employment, 20% by indirect employment and 44% by induced employment (Figure 3-23).
- The 2007 upstream and downstream impacts of Blue Box program resulted in 5,609 FTE jobs in the Ontario economy (Figure 3-24).
- Of this total number of jobs, 1,883 FTE jobs were directly created and 1,123 FTE jobs were indirectly created.
- Just over 2,600 additional induced FTE jobs were also created in the economy through the income spending of direct and indirect employees in the upstream and downstream sectors.
- Total Gross Output amounted to \$915 million and of this sum, the direct portion accounted for 45%, indirect for 16% and induced for 38% (Figure 3-25).

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- In 2007, each tonne of Blue Box material marketed created approximately: \$603 of total GDP, \$305 of total labour income and \$1,013 of Gross Output.
- In 2007, approximately .006 jobs were created for each tonne of Blue Box material marketed.
- Tax revenues spawned by the 2007 Blue Box Program in upstream and downstream sectors totalled \$33.2 million (Figure 3-26).
- Federal coffers received, \$12.1 million, provincial coffers \$21.2 million and municipal coffers approximately \$26,000.
- In 2007, each tonne of Blue Box material marketed created approximately: \$13.37 of federal taxes, \$23.38 of provincial taxes and \$0.03 of municipal taxes.

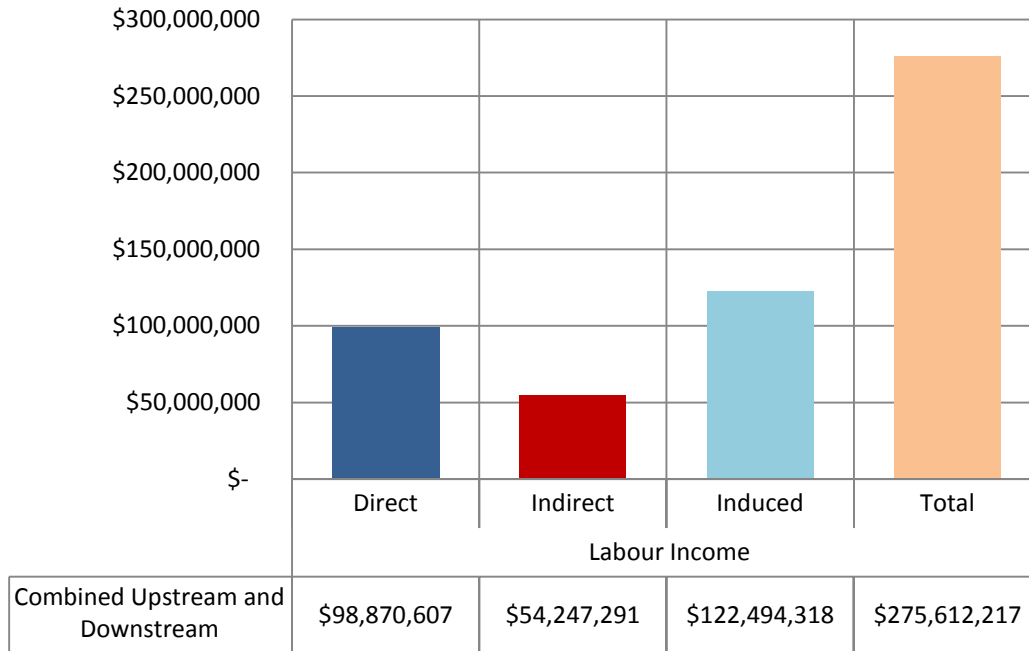
Figure 3-22 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – GDP (2007)



Source: AECOM, 2009 and Statistics Canada, 2009

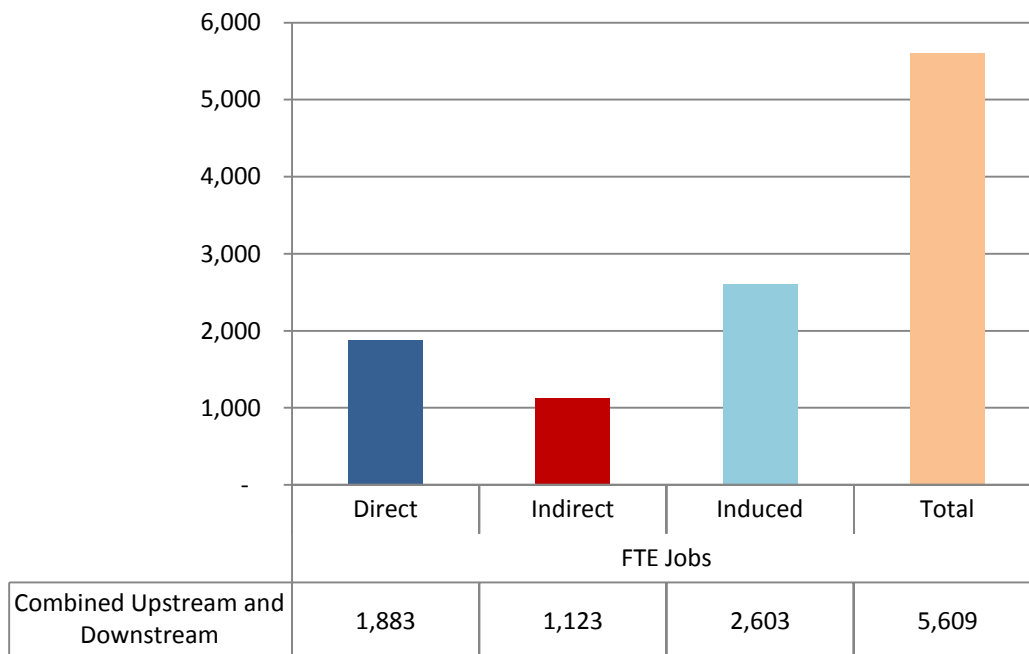
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Figure 3-23 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – Labour Income (2007)



Source: AECOM, 2009 and Statistics Canada, 2009

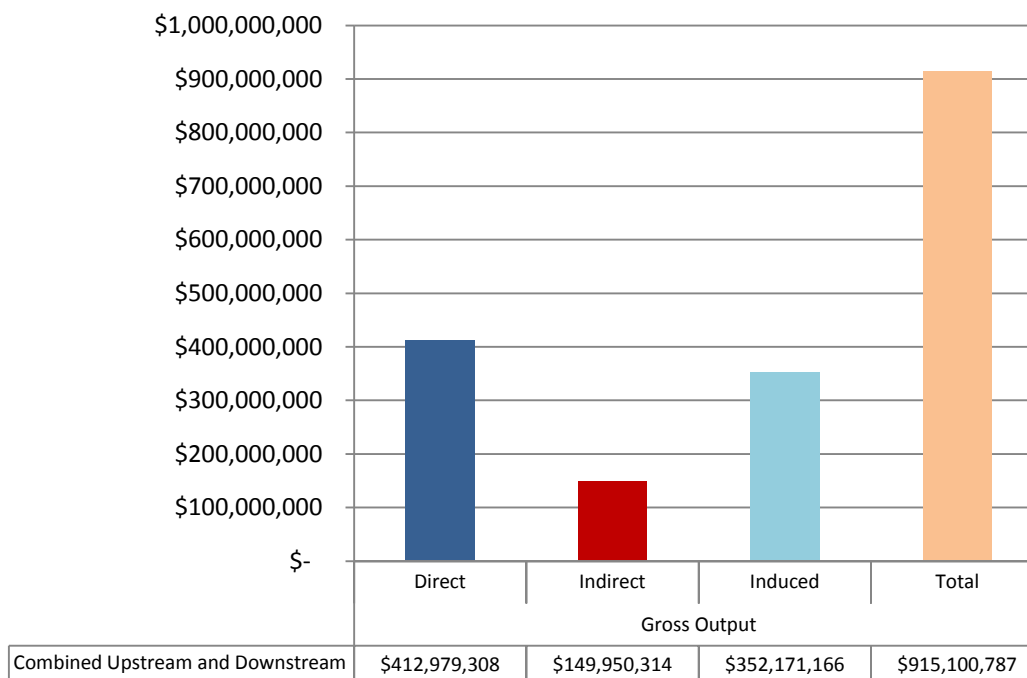
Figure 3-24 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – FTE Jobs (2007)



Source: AECOM, 2009 and Statistics Canada, 2009

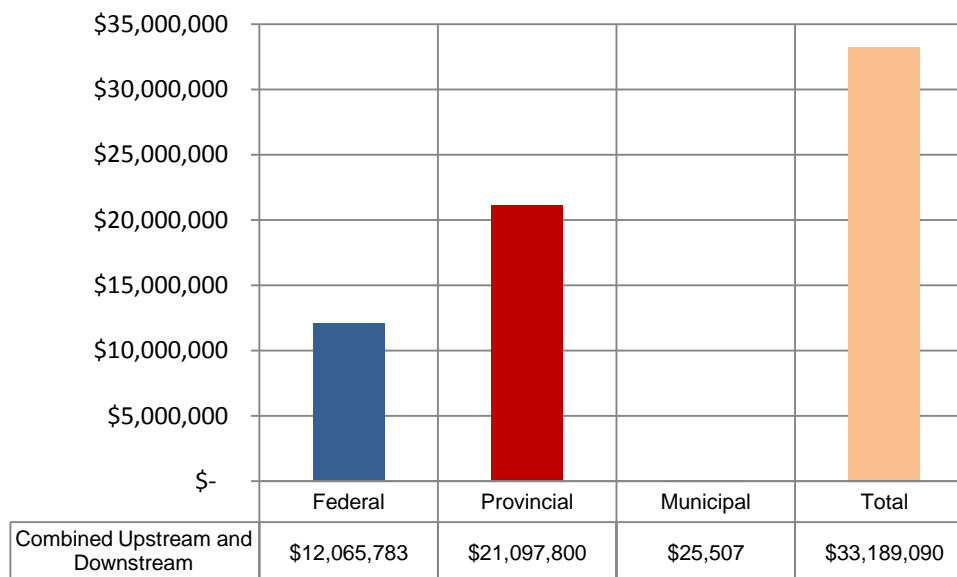
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Figure 3-25 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – Gross Output (2007)



Source: AECOM, 2009 and Statistics Canada, 2009

Figure 3-26 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – Taxes (2007)



Source: AECOM, 2009 and Statistics Canada, 2009

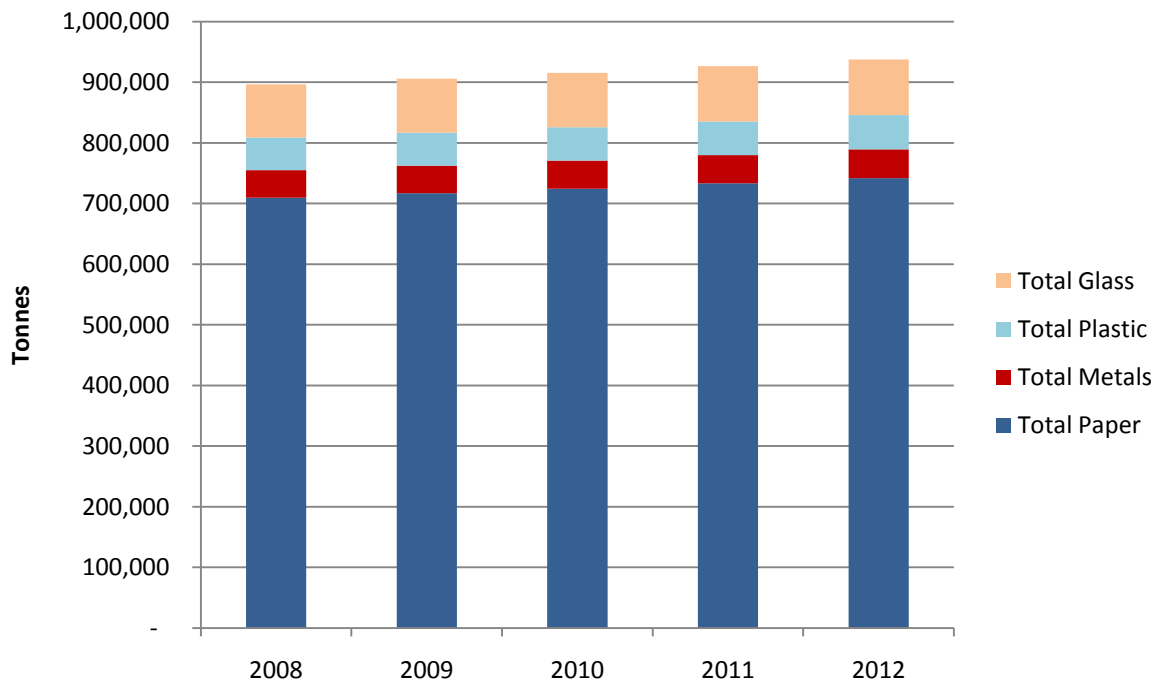
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3.4 Projections (2008 – 2012)

3.4.1 Forecast of Tonnes Marketed

The forecast of Blue Box tonnes marketed for the 2008 to 2012 time frame was calculated by deriving provincial 2007 tonne per capita statistics for each commodity and then multiplying these by the provincial population forecast (Ministry of Finance, 2009). The results are shown in Figure 3-27 and Table 3-6.

Figure 3-27 Blue Box Forecast - Tonnes Marketed (2008 – 2012)



Source: AECOM, 2009

- The overall growth in tonnes marketed is approximately 1 % per year.
- This forecast continues to reflect historic trends. As previously indicated, the Blue Box program is a mature entity and volume growth is attributable to general population growth as opposed to increased capture of materials on a per capita basis.

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Table 3-6 Blue Box Forecast - Tonnes Marketed (2008 – 2012)

		2008	2009	2010	2011	2012
Paper	Printed Paper	504,602	509,726	515,311	521,377	527,661
	Paper Packaging	202,040	204,092	206,328	208,757	211,273
	Polycoat	2,902	2,931	2,964	2,998	3,035
	Total Paper	709,544	716,750	724,603	733,132	741,969
Metals	Aluminum	10,927	11,038	11,159	11,290	11,426
	Steel	34,374	34,723	35,103	35,517	35,945
	Total Metals	45,301	45,761	46,262	46,807	47,371
Plastic	PET	27,361	27,639	27,942	28,271	28,611
	HDPE	15,338	15,494	15,664	15,848	16,039
	Film	4,866	4,915	4,969	5,027	5,088
	Tubs & Lids	2,845	2,874	2,906	2,940	2,976
	Polystyrene	421	425	430	435	440
	Mixed	2,851	2,879	2,911	2,945	2,981
	Total Plastic	53,682	54,227	54,821	55,466	56,135
Glass	Flint	11,907	12,028	12,159	12,302	12,451
	Coloured	6,828	6,897	6,973	7,055	7,140
	Mixed	83,392	84,239	85,162	86,164	87,203
	Total Glass	87,975	88,868	89,842	90,899	91,995
Total All Commodities		910,653	919,901	929,981	940,927	952,268

Source: AECOM, 2009

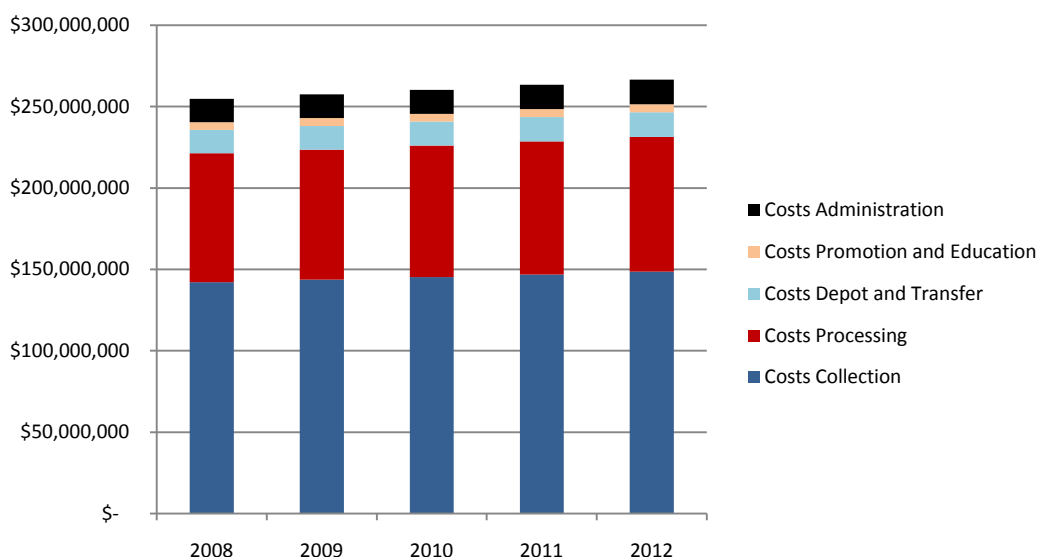
3.4.2 Forecast of System Costs and Revenues

The forecast of system costs is derived by calculating the 2007 costs per tonne of material marketed for each system component and then multiplying these figures by the forecast of tonnes marketed. The results of this calculation are set out in Figure 3-28 and Table 3-7.

- Costs are projected to rise at gradual rate consistent with past trends.
- The gross program cost is projected to be in the order of \$255 million in 2008, rising to approximately \$267 million in 2012.
- Collection and Processing are the dominant cost categories in the system accounting for approximately 87% of the overall total.

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Figure 3-28 Projected Blue Box Costs (2008 – 2012)



Source: AECOM, 2009

Table 3-7 Projected Blue Box Costs (2008 – 2012)

		2008	2009	2010	2011	2012
Costs	Collection	\$ 142,173,631	\$ 143,617,420	\$ 145,191,062	\$ 146,900,060	\$ 148,670,683
	Processing	\$ 79,081,023	\$ 79,884,100	\$ 80,759,404	\$ 81,709,998	\$ 82,694,868
	Depot and Transfer	\$ 14,457,891	\$ 14,604,713	\$ 14,764,739	\$ 14,938,530	\$ 15,118,588
	Promotion and Education	\$ 4,713,918	\$ 4,761,788	\$ 4,813,964	\$ 4,870,628	\$ 4,929,335
	Administration	\$ 14,403,105	\$ 14,549,371	\$ 14,708,791	\$ 14,881,923	\$ 15,061,299
	Total Costs	\$ 254,829,568	\$ 257,417,391	\$ 260,237,961	\$ 263,301,138	\$ 266,474,772
Revenues		\$ 129,287,677	\$ 62,708,822	\$ 101,585,308	\$ 101,355,915	\$ 101,135,285
Costs and Revenues		\$ 384,117,245	\$ 320,126,214	\$ 361,823,269	\$ 364,657,054	\$ 367,610,057

Source: AECOM, 2009

The forecast of system revenues is a more difficult and speculative task than the prediction of costs. In the case of revenues the recent downturn in the world economy has had a major impact on revenues derived from recycling worldwide. The slowdown, and in some cases collapse, of manufacturing around the world has significantly depressed prices and demand for recycled materials. Public and private sector recyclers at home and abroad have been forced to drastically discount prices and in many cases store materials in hopes that demand will pick up and prices will improve.

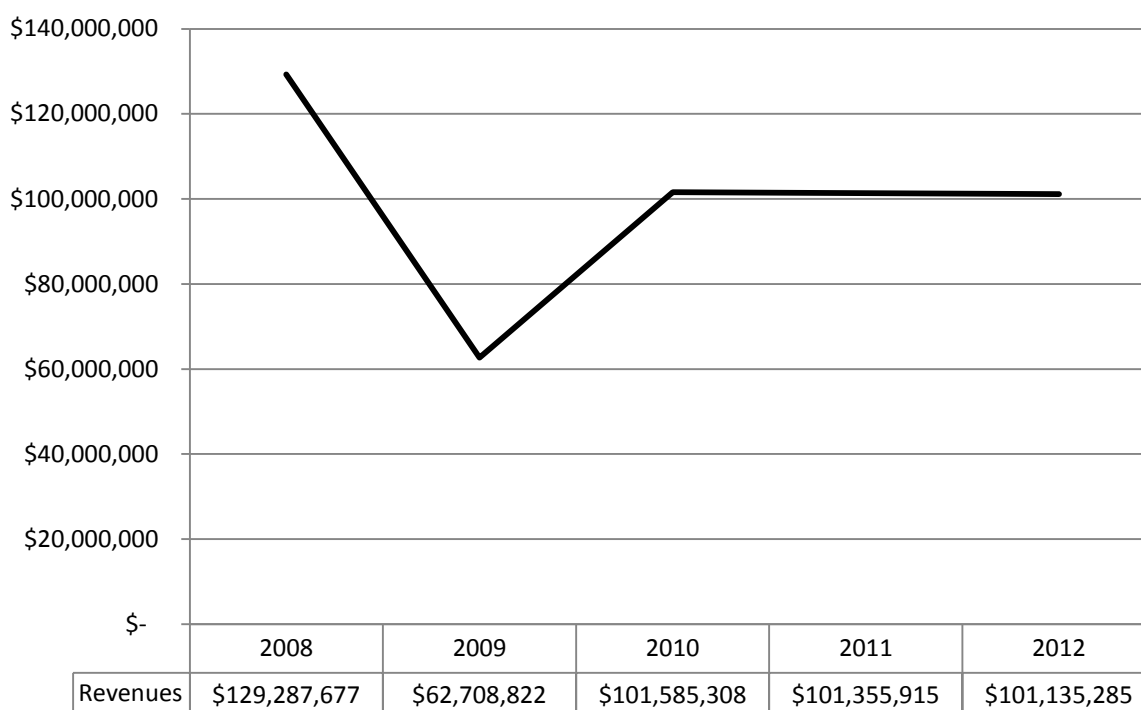
The slowdown, and in some cases collapse, of manufacturing around the world has significantly depressed prices and demand for recycled materials.

Section 3: The Blue Box Program

The section of this report entitled *Ontario Market Prices* provides a discussion on commodity prices looking at past and current conditions and then makes a prediction of price structures going forward. The forecast of revenues in this chapter relies on the latter. Calculation of revenues was accomplished by multiplying the forecast of commodity prices by the forecast of commodity tonnes.

- Figure 3-29 depicts the forecast of Blue Box revenues.
- In 2008, the revenues are projected to be \$129 million which is 5% higher than the corresponding figure for 2007 but in 2009 they are forecasted to only be \$63 million (about 41% of what they were in 2007).
- By 2012, the Blue box revenues at \$101 million show significant rebound from 2009 but they are still 5% below the 2007 figure.

Figure 3-29 Projected Blue Box Revenues (2008 – 2012)



Source: AECOM 2009, Based on StewardEdge, 2009

Section 3: The Blue Box Program

3.4.3 Projected Blue Box and Upstream Economic Impacts (2008 - 2012)

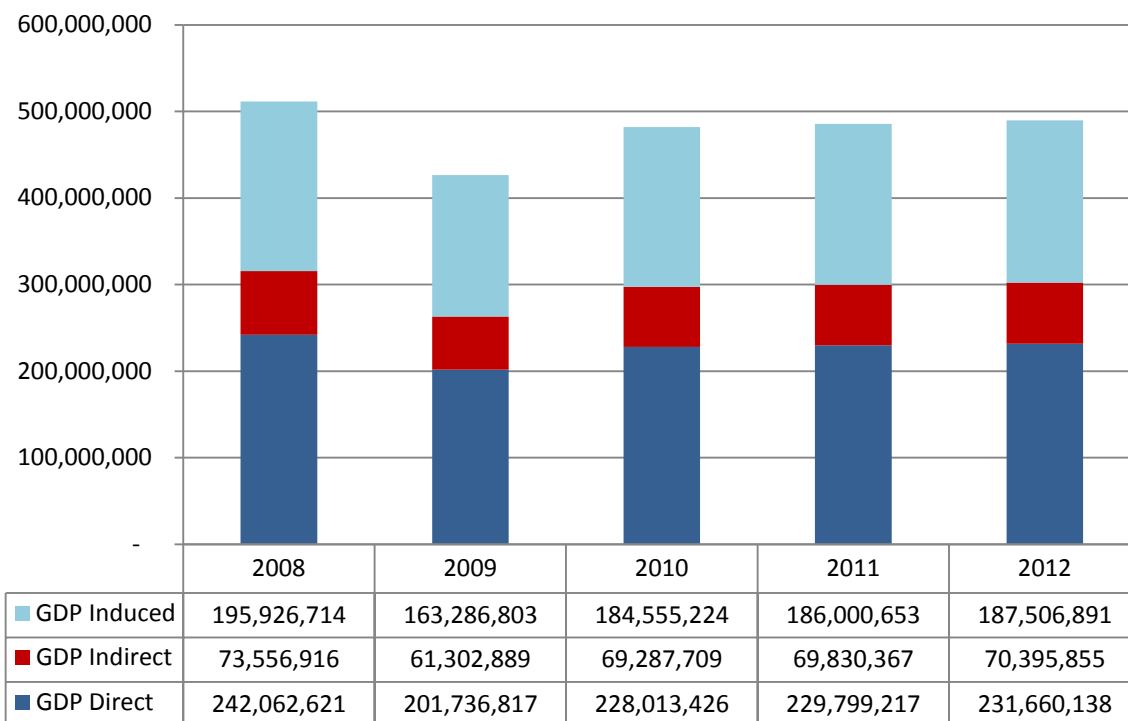
In general, the economic outputs of the Blue Box program over the next five years are projected to be less than those generated in 2007. Figures 3-30 through to 3-34 and supporting Table 3-8 set out the forecasts.

- In the 2012 forecasts, total GDP is \$490 million, total Labour Income is \$245 million and total Gross Output is \$812 million
- In 2012, the direct economic output of the Blue Box program is projected to be \$367 million, which is 2% higher than the 2007 figure.
- This 2% difference is extrapolated across all of the other dimensions.
- In 2012, the Blue Box program is projected to create 4,990 jobs in the Ontario economy.
- Of this total job creation, 1,746 jobs will be direct positions in the Waste Management and Remediation sector and 934 jobs will be created in upstream businesses that supply the sector. Over 2,300 additional induced FTE jobs will be created in the economy through the income spending of direct and indirect employees.
- In 2012, for each tonne of Blue Box material marketed, the following will be created: \$514 of total GDP, \$256 of total Labour Income and \$852 of Gross Output.
- In 2012, for every tonne of Blue Box material marketed there will be 0.005 jobs created.
- The tax generation in 2012 is expected to be \$30 million with 36% being federal, 34% being provincial and a fraction of a percent being municipal.
- In 2012, for every tonne of Blue Box material marketed the following taxes will be generated: \$11.23 of Federal tax, \$20.26 of provincial tax and \$0.03 of municipal tax.

Section 3: The Blue Box Program

3.4.3.1 Waste Management and Remediation Sector

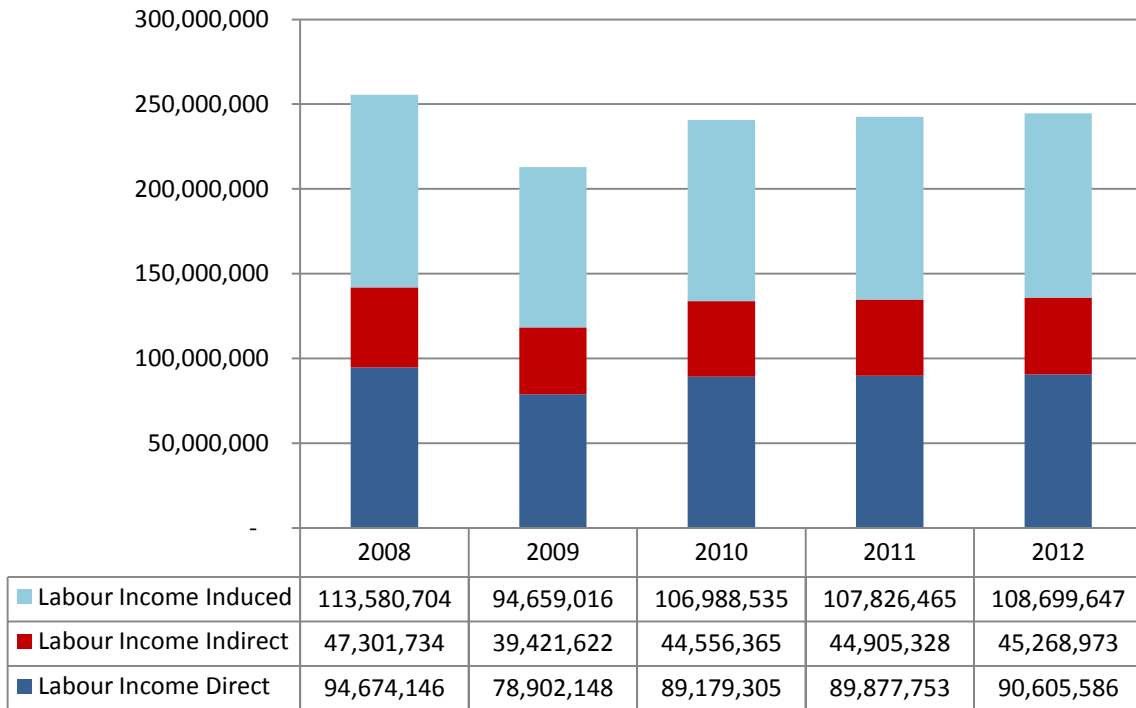
Figure 3-30 Blue Box Economic Outputs – GDP (2008-2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

Section 3: The Blue Box Program

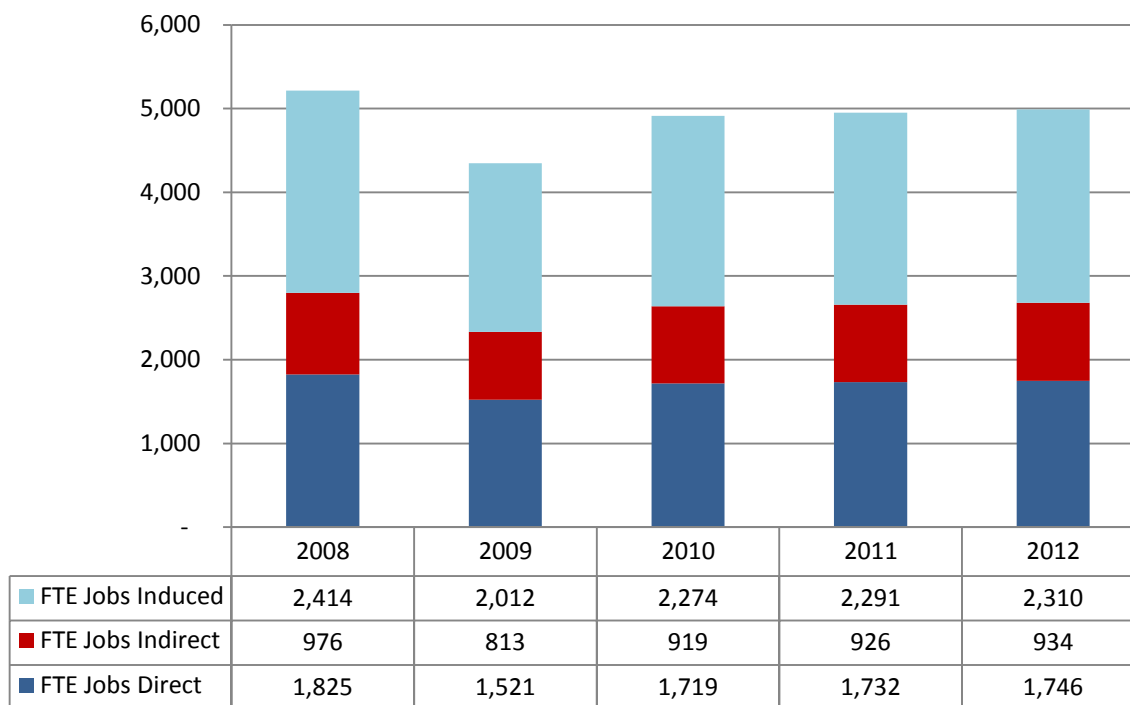
Figure 3-31 Blue Box Economic Outputs – Labour Income (2008-2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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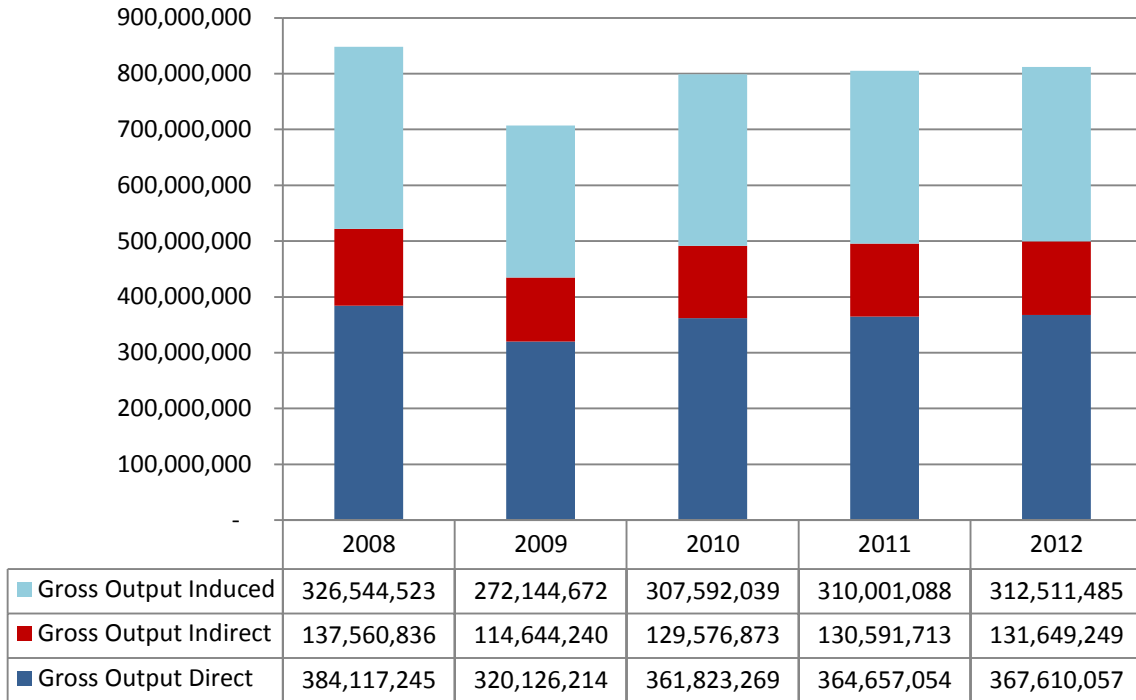
Figure 3-32 Blue Box Economic Outputs – FTE Jobs (2008-2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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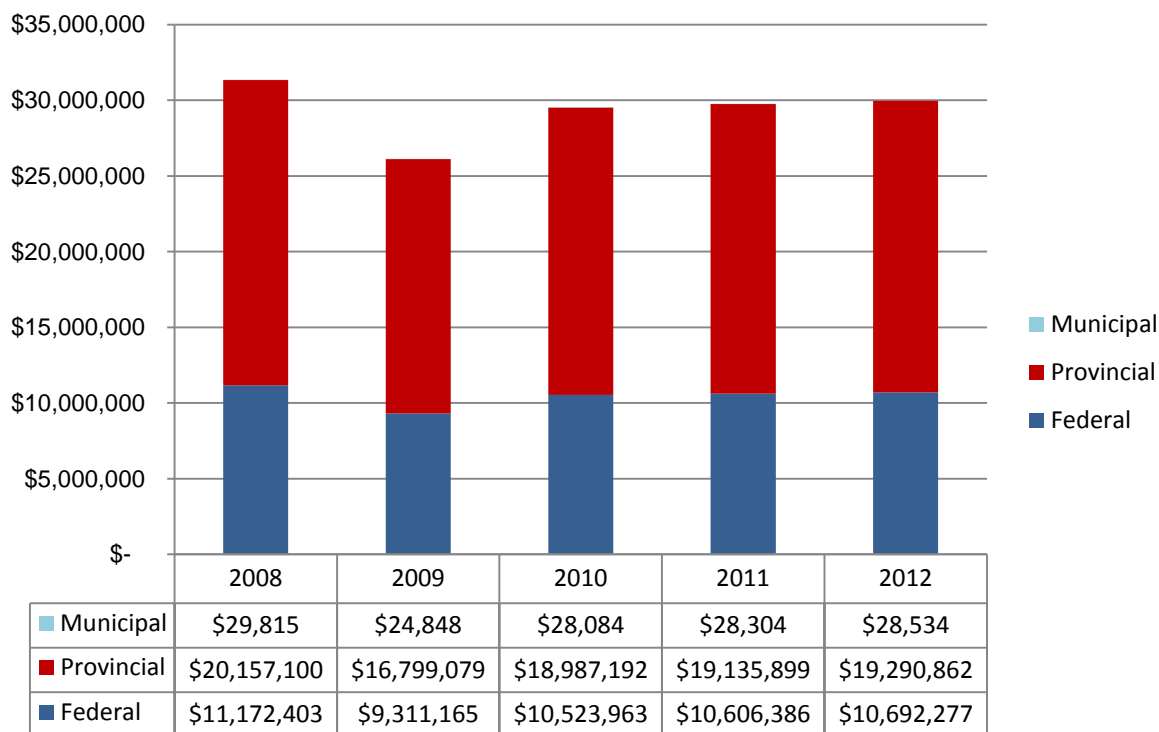
Figure 3-33 Blue Box Economic Outputs – Gross Output (2008-2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 3-34 Blue Box Economic Outputs – Taxes (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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Table 3-8 Blue Box Economic Outputs (2008 – 2012)

		2008	2009	2010	2011	2012
GDP	Direct	242,062,621	201,736,817	228,013,426	229,799,217	231,660,138
	Indirect	73,556,916	61,302,889	69,287,709	69,830,367	70,395,855
	Induced	195,926,714	163,286,803	184,555,224	186,000,653	187,506,891
	Total	511,546,251	426,326,510	481,856,358	485,630,237	489,562,885
Labour Income	Direct	94,674,146	78,902,148	89,179,305	89,877,753	90,605,586
	Indirect	47,301,734	39,421,622	44,556,365	44,905,328	45,268,973
	Induced	113,580,704	94,659,016	106,988,535	107,826,465	108,699,647
	Total	255,556,583	212,982,787	240,724,205	242,609,547	244,574,206
FTE Jobs	Direct	1,825	1,521	1,719	1,732	1,746
	Indirect	976	813	919	926	934
	Induced	2,414	2,012	2,274	2,291	2,310
	Total	5,214	4,345	4,911	4,950	4,990
Gross Output	Direct	384,117,245	320,126,214	361,823,269	364,657,054	367,610,057
	Indirect	137,560,836	114,644,240	129,576,873	130,591,713	131,649,249
	Induced	326,544,523	272,144,672	307,592,039	310,001,088	312,511,485
	Total	848,222,604	706,915,126	798,992,180	805,249,854	811,770,791

Source: AECOM 2009 and Statistics Canada, 2009

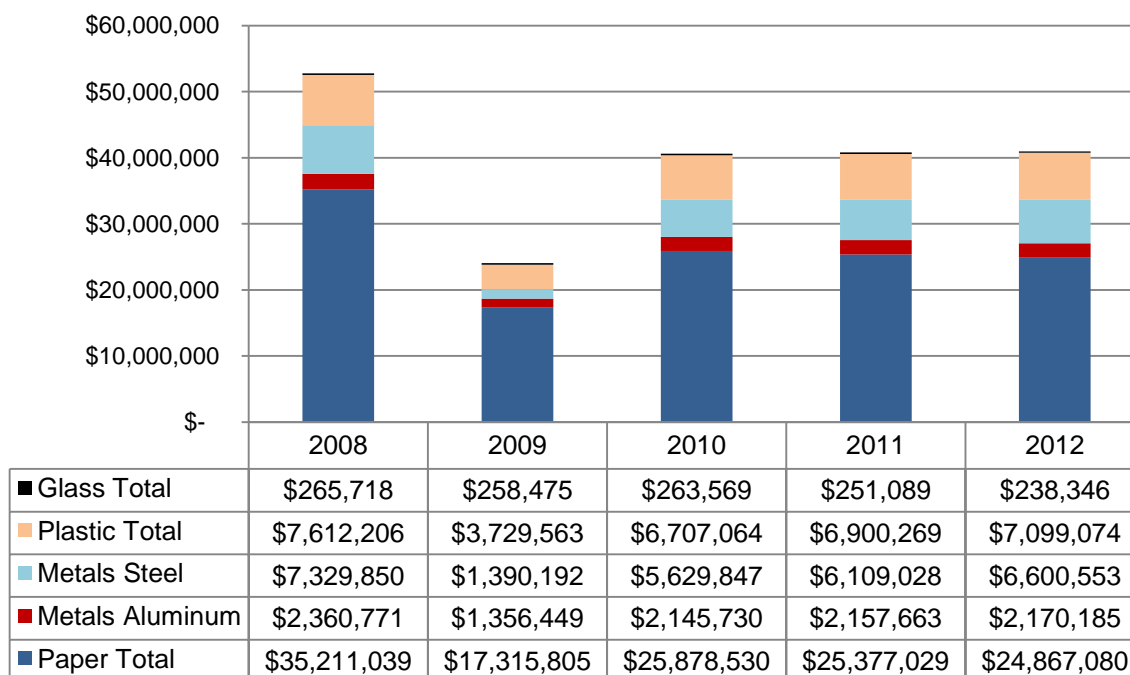
3.4.4 Projected Downstream Economic Impacts (2008 - 2012)

- The projection of Blue Box tonnes marketed was previously set out in Figure 3-26. The projected tonnage shows steady limited growth over the period in the order of roughly 10,000 tonnes per year. By 2012, the total tonnage is projected to be about 950,000 tonnes.
- The projected value of commodity flows to Ontario end users from 2008 to 2012 is projected in Figure 3-35 and Table 3-9.
- In 2012, the total value of Blue box commodity flows to Ontario end users is estimated to be in the order of \$41 million. Paper commodities account for almost 61% of this value. Metals account for 21% of the total and plastics for 17%. Glass accounts for less than 1%.

Section 3: The Blue Box Program

Economic Impacts

Figure 3-35 Value of Blue Box Commodity Flows to End Use Industry Sectors in Ontario (2008 -2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

Section 3: The Blue Box Program

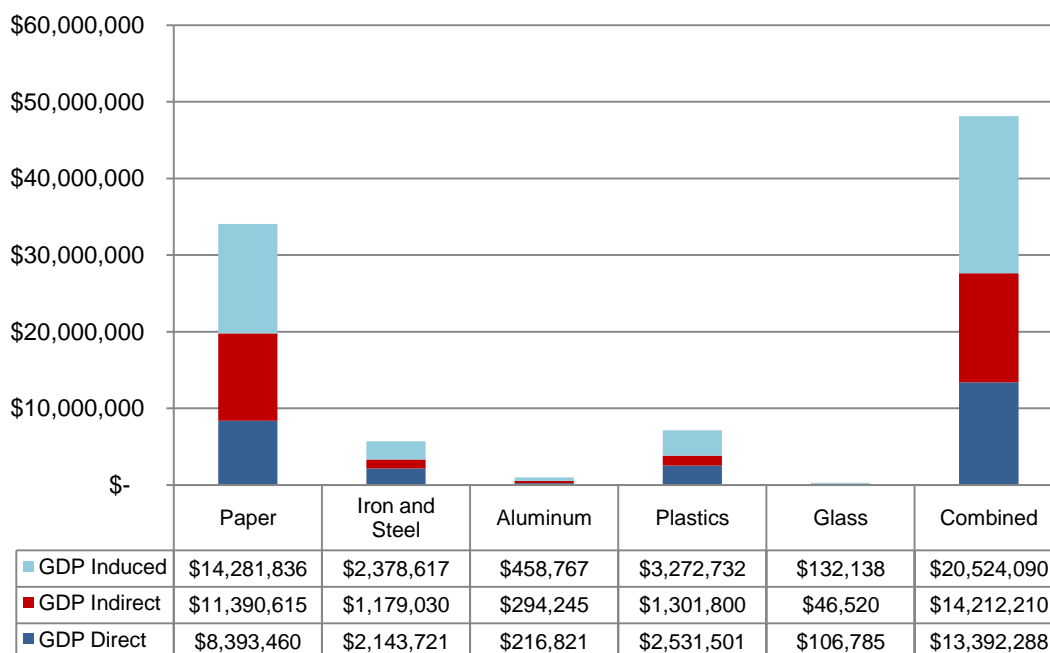
Table 3-9 Projected Blue Box Commodity Sales to Downstream Sectors in Ontario (2008 – 2012)

		2008	2009	2010	2011	2012
Paper	Printed Paper	\$ 23,519,874	\$ 11,558,297	\$ 17,137,917	\$ 16,670,280	\$ 16,193,782
	Paper Packaging	\$ 11,677,402	\$ 5,751,762	\$ 8,734,498	\$ 8,701,666	\$ 8,669,272
	Polycoat	\$ 13,763	\$ 5,746	\$ 6,116	\$ 5,083	\$ 4,026
	Total	\$ 35,211,039	\$ 17,315,805	\$ 25,878,530	\$ 25,377,029	\$ 24,867,080
Metals	Aluminum	\$ 2,360,771	\$ 1,356,449	\$ 2,145,730	\$ 2,157,663	\$ 2,170,185
	Steel	\$ 7,329,850	\$ 1,390,192	\$ 5,629,847	\$ 6,109,028	\$ 6,600,553
	Total	\$ 9,690,621	\$ 2,746,642	\$ 7,775,577	\$ 8,266,691	\$ 8,770,738
Plastic	PET	\$ 2,303,231	\$ 1,117,042	\$ 1,958,035	\$ 1,949,883	\$ 1,941,810
	HDPE	\$ 4,917,726	\$ 2,548,855	\$ 4,527,118	\$ 4,719,055	\$ 4,916,256
	Film	\$ 13,675	\$ (789)	\$ 24,430	\$ 25,951	\$ 27,512
	Tubs & Lids	\$ 351,694	\$ 38,313	\$ 174,180	\$ 183,088	\$ 192,236
	Polystyrene	\$ 25,880	\$ 26,143	\$ 23,302	\$ 22,291	\$ 21,260
	Mixed	\$ -	\$ -	\$ -	\$ -	\$ -
	Total	\$ 7,612,206	\$ 3,729,563	\$ 6,707,064	\$ 6,900,269	\$ 7,099,074
Glass	Flint	\$ 265,718	\$ 258,475	\$ 263,569	\$ 251,089	\$ 238,346
	Coloured	\$ -	\$ -	\$ -	\$ -	\$ -
	Mixed	\$ -	\$ -	\$ -	\$ -	\$ -
	Total	\$ 265,718	\$ 258,475	\$ 263,569	\$ 251,089	\$ 238,346
Sum of Commodities		\$ 52,779,584	\$ 24,050,485	\$ 40,624,740	\$ 40,795,078	\$ 40,975,238

- The projected pattern of economic outputs generated by the downstream industry sectors that purchase Blue Box material continues to reflect the current pattern. In 2012, the paper manufacturing sector is predicted to generate the largest co-related economic outputs respectively followed by plastics, iron and steel, aluminum and then glass. All sectors combined generate about \$48 million in GDP, \$27 million in income and \$91 million in Gross Output (Figures 3-36 to 3-38 and Table 3-10).
- Blue Box derived job outputs produced by the downstream industry sectors are projected to total just over 532 in 2012. Paper manufacturing stands out accounting for almost 75% of these jobs (Figure 3-39).
- The taxes that will be generated sum to approximately \$2.0 million. The Federal contribution is close to \$760,000 and the provincial contribution is in the order of \$1.3 million. The municipal contribution is minimal at approximately \$1,500 (Figure 3-40).

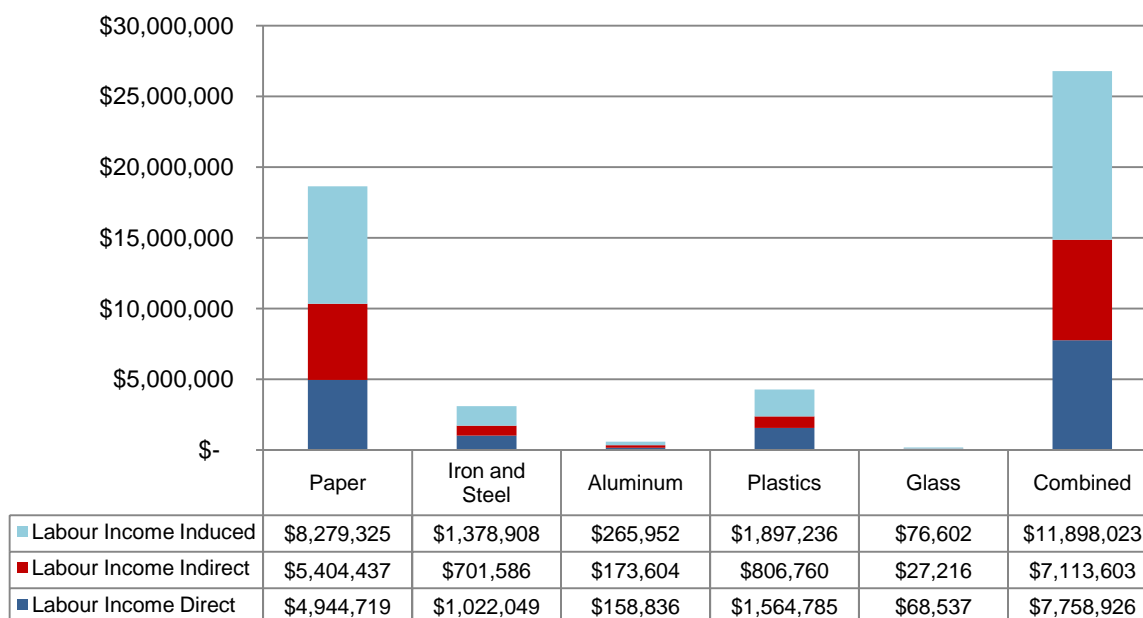
Section 3: The Blue Box Program

Figure 3-36 Economic Outputs from Blue Box Downstream Sectors – GDP (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

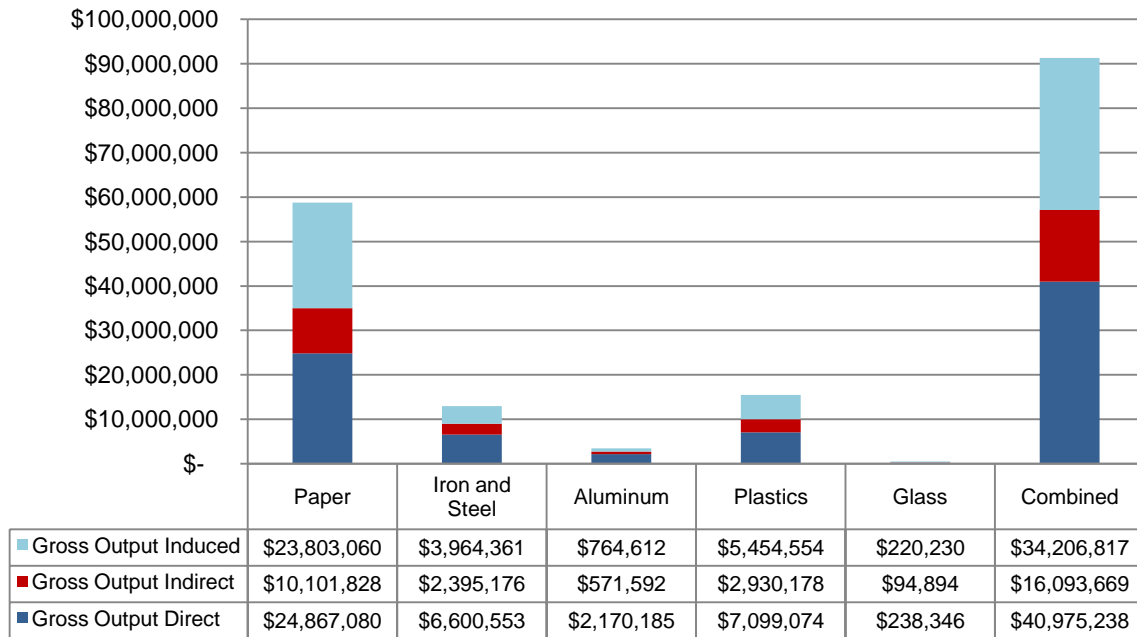
Figure 3-37 Economic Outputs from Blue Box Downstream Sectors – Labour Income (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

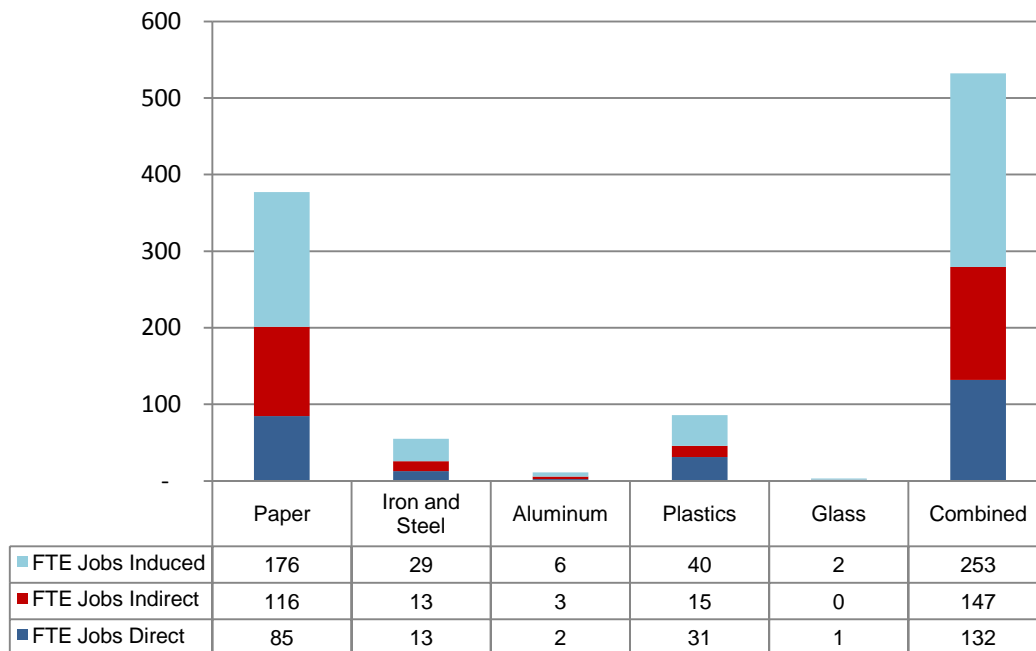
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Figure 3-38 Economic Outputs from Blue Box Downstream Sectors – Gross Output (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

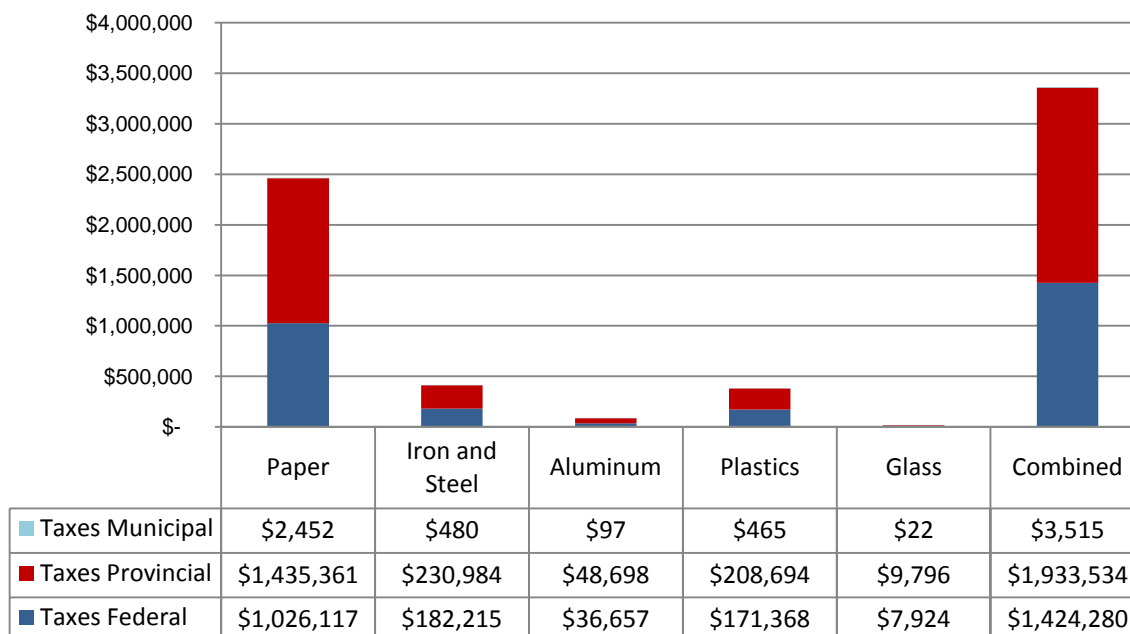
Figure 3-39 Economic Outputs from Blue Box Downstream Sectors (2012) – Jobs



Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 3-40 Economic Outputs from Blue Box Downstream Sectors – Taxes (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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Table 3-10 Economic Outputs from Blue Box Downstream Sectors (2012)

		Paper	Iron and Steel	Aluminum	Plastics	Glass	Combined
GDP	Direct	\$ 8,393,460	\$ 2,143,721	\$ 216,821	\$ 2,531,501	\$ 106,785	\$ 13,392,288
	Indirect	\$ 11,390,615	\$ 1,179,030	\$ 294,245	\$ 1,301,800	\$ 46,520	\$ 14,212,210
	Induced	\$ 14,281,836	\$ 2,378,617	\$ 458,767	\$ 3,272,732	\$ 132,138	\$ 20,524,090
	Total	\$ 34,065,910	\$ 5,701,368	\$ 969,833	\$ 7,106,034	\$ 285,443	\$ 48,128,588
Labour Income	Direct	\$ 4,944,719	\$ 1,022,049	\$ 158,836	\$ 1,564,785	\$ 68,537	\$ 7,758,926
	Indirect	\$ 5,404,437	\$ 701,586	\$ 173,604	\$ 806,760	\$ 27,216	\$ 7,113,603
	Induced	\$ 8,279,325	\$ 1,378,908	\$ 265,952	\$ 1,897,236	\$ 76,602	\$ 11,898,023
	Total	\$ 18,628,481	\$ 3,102,544	\$ 598,392	\$ 4,268,781	\$ 172,354	\$ 26,770,552
FTE Jobs	Direct	85	13	2	31	1	132
	Indirect	116	13	3	15	0	147
	Induced	176	29	6	40	2	253
	Total	377	55	11	86	3	532
Gross Output	Direct	\$ 24,867,080	\$ 6,600,553	\$ 2,170,185	\$ 7,099,074	\$ 238,346	\$ 40,975,238
	Indirect	\$ 10,101,828	\$ 2,395,176	\$ 571,592	\$ 2,930,178	\$ 94,894	\$ 16,093,669
	Induced	\$ 23,803,060	\$ 3,964,361	\$ 764,612	\$ 5,454,554	\$ 220,230	\$ 34,206,817
	Total	\$ 58,771,968	\$ 12,960,090	\$ 3,506,389	\$ 15,483,807	\$ 553,470	\$ 91,275,724
Taxes	Federal	\$ 1,026,117	\$ 182,215	\$ 36,657	\$ 171,368	\$ 7,924	\$ 1,424,280
	Provincial	\$ 1,435,361	\$ 230,984	\$ 48,698	\$ 208,694	\$ 9,796	\$ 1,933,534
	Municipal	\$ 2,452	\$ 480	\$ 97	\$ 465	\$ 22	\$ 3,515
	Total	\$ 2,463,930	\$ 413,679	\$ 85,452	\$ 380,526	\$ 17,742	\$ 3,361,329

Source: AECOM 2009, Based on Statistics Canada, 2009

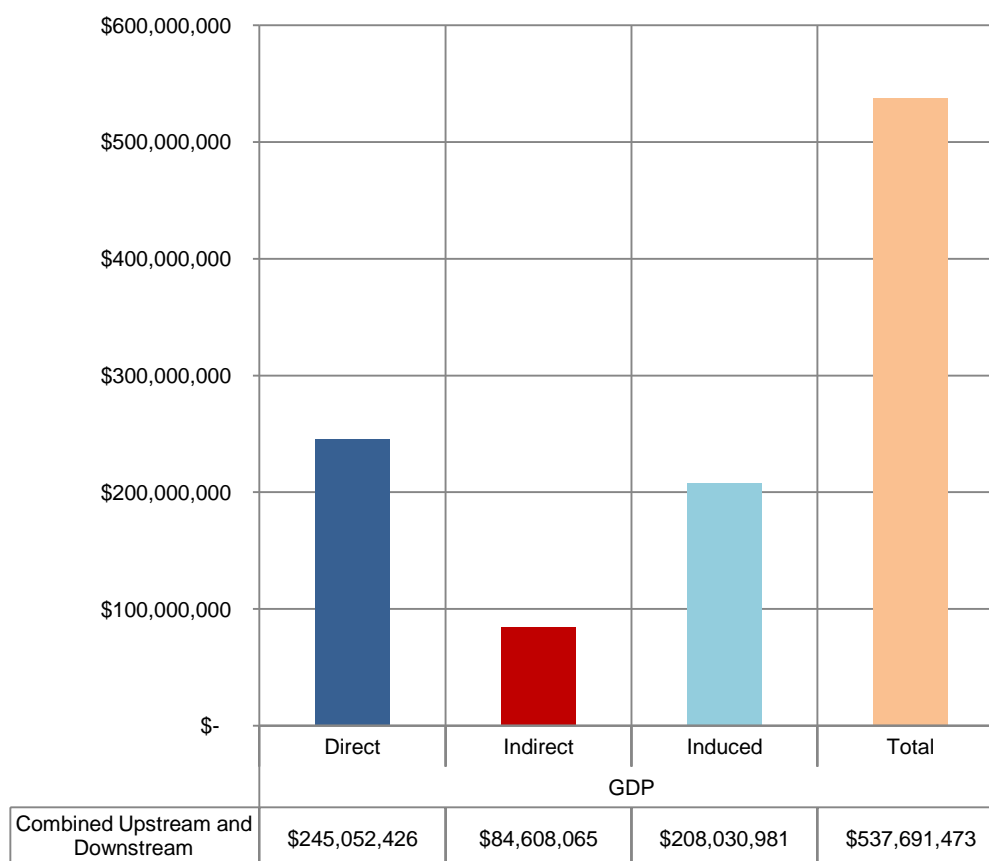
3.4.5 2012 Combined Upstream and Downstream Economic Impacts

- In 2012, the economic output of the upstream and downstream sectors associated with the Blue Box program is projected to be \$409 million.
- The Gross Domestic Product (GDP) impact is anticipated to be \$537 million and of this sum, 45% will be attributable to direct effects, 16% to indirect effects and 39% to induced income spending by direct and indirect labour (Figure 3-41).
- Labour Income generated from the direct Gross Output is expected to be \$271 million and of this sum, 35% will be accounted for by direct employment, 20% by indirect employment and 44% by induced employment (Figure 3-42).
- The 2007 upstream and downstream impacts of Blue Box program are expected to create in 5,522 FTE jobs in the Ontario economy (Figure 3-43).
- Of this total number of jobs, 1,878 FTE jobs will be directly created and 1,081 indirectly created.
- Approximately 2,560 additional induced FTE jobs will also be created in the economy through the income spending of direct and indirect employees in the upstream and downstream sectors.

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- Total Gross Output is expected to amount to \$903 million and of this sum, the direct portion will account for 45%, indirect for 16% and induced for 38% (Figure 3-44).
- In 2012, each tonne of Blue Box material marketed will create approximately: \$565 of total GDP, \$285 of total labour income and \$950 of Gross Output.
- In 2012, approximately .006 jobs will be created for each tonne of Blue Box material marketed.
- Tax revenues spawned by the 2007 Blue Box Program in upstream and downstream sectors are projected to total \$33.4 million (Figure 3-45).
- Federal coffers will receive, \$12.1 million, provincial coffers \$21.2 million and municipal coffers approximately \$26,000.
- In 2007, each tonne of Blue Box material marketed will create approximately: \$12 of federal taxes, \$22 of provincial taxes and \$0.03 of municipal taxes.

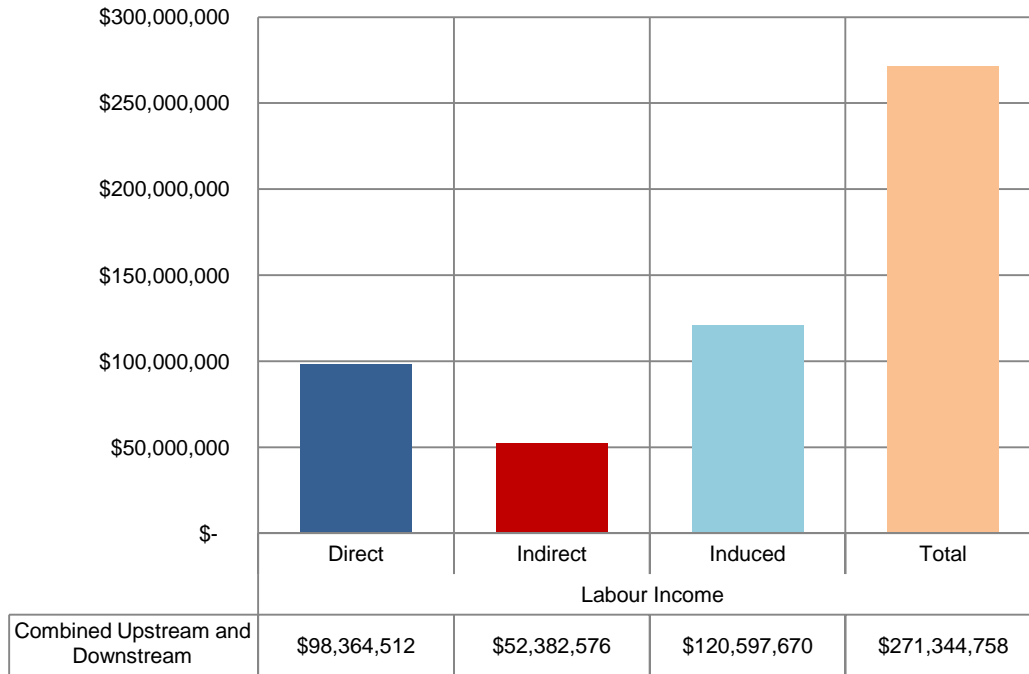
Figure 3-41 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – GDP (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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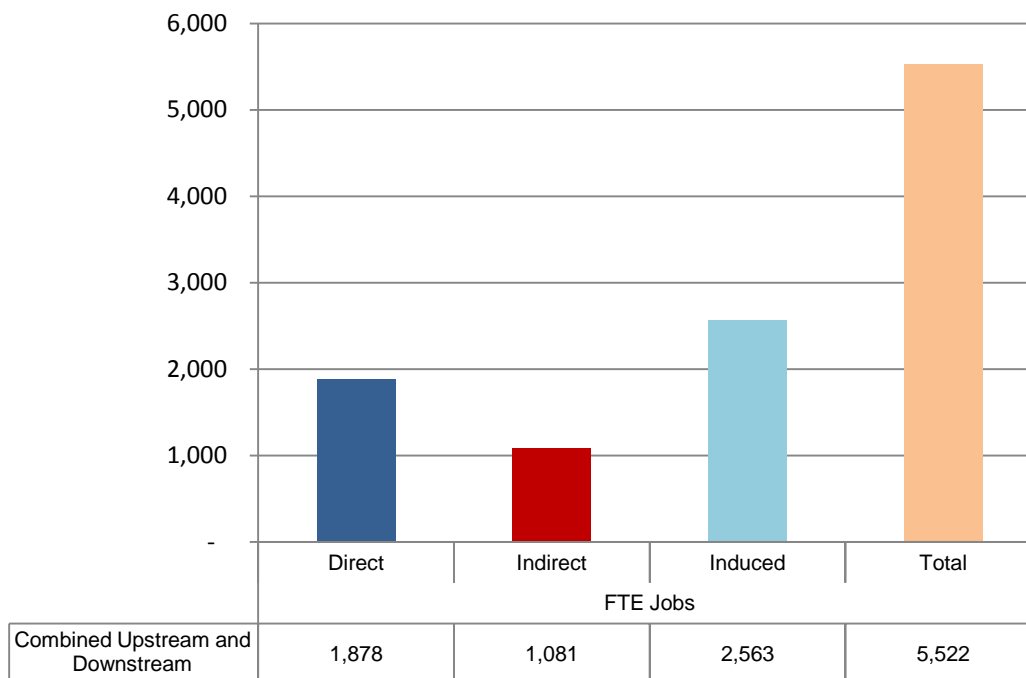
Figure 3-42 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – Labour Income (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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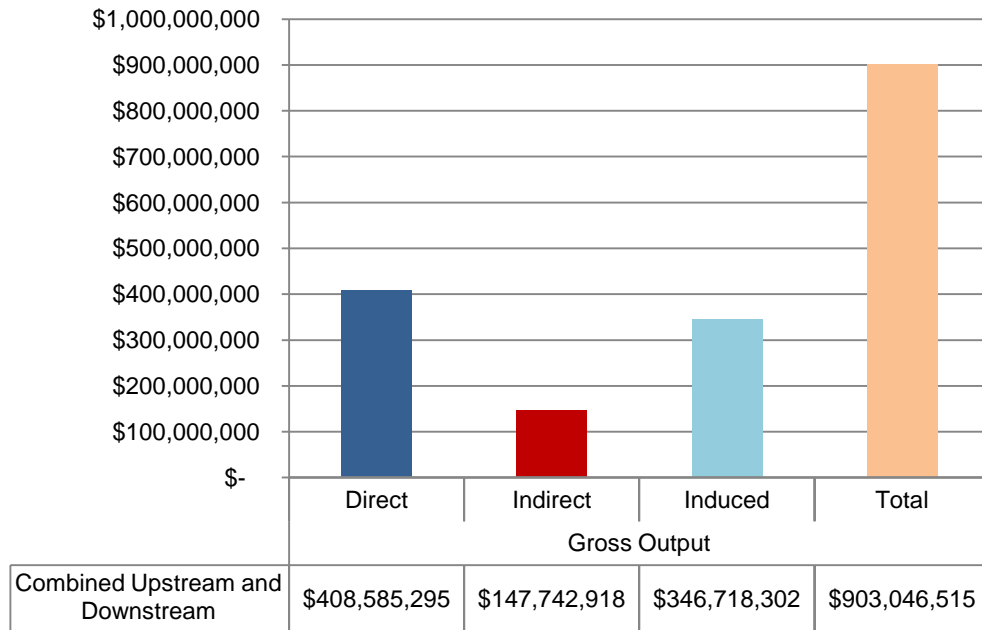
Figure 3-43 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – FTE Jobs (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

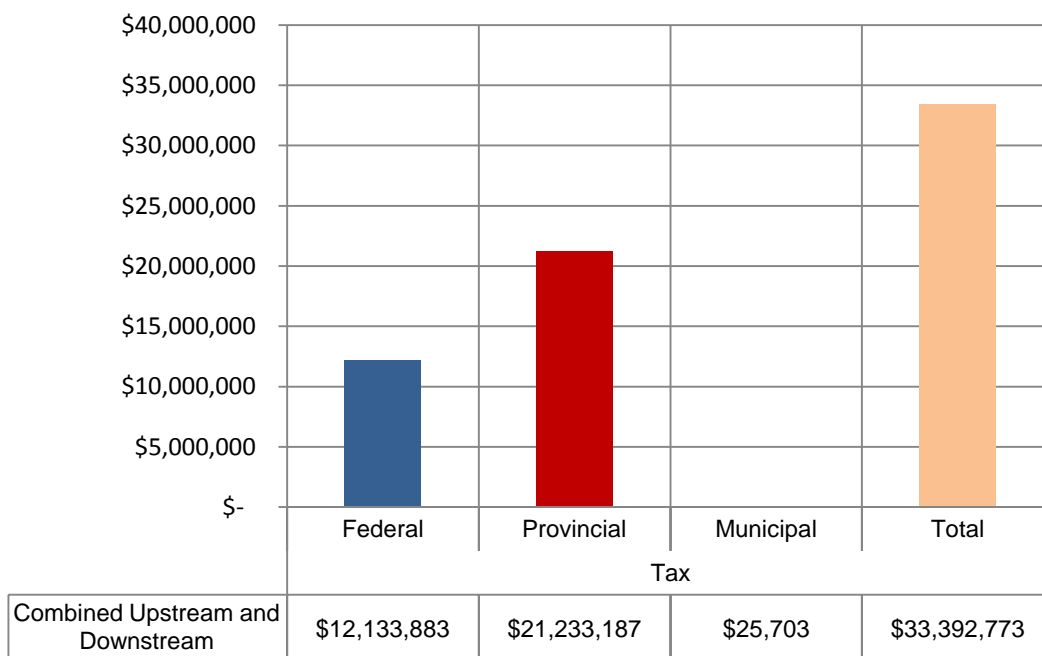
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Figure 3-44 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – Gross Output (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

Figure 3-45 Economic Outputs from Blue Box Combined Upstream and Downstream Sectors – Taxes (2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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Section 4: MHSW

4. MHSW

4.1 Program Description

Stewardship Ontario was named as the IFO for the Municipal Hazardous or Special Waste (MHSW) Program in 2006. Municipal hazardous waste is defined as corrosive, flammable or toxic wastes as designated in applicable regulations generated by households and small quantity IC&I generators. MHSW wastes include:

- Batteries,
- Pressurized & aerosol containers,
- Portable fire extinguishers,
- Fertilizers, fungicides, herbicides, insecticides, pesticides,
- Paints & coatings,
- Oil bottles & filters,
- Fluorescent light bulbs or tubes,
- Pharmaceuticals, sharps, syringes,
- Switches, thermostats, thermometers, barometers & measuring devices containing,
- Mercury, and
- Antifreeze & solvents.

Lubricating oils are specifically excluded from the program.

The Phase I program began on July 1, 2008. This phase is the focus of this study.

4.1.1 MHSW Phase 1 Materials

The MHSW Program is to be implemented in multiple phases. The first phase of the program targets the following materials:

- Paints and coatings, and containers in which they are contained;
- Solvent, and containers in which they are contained;
- Oil filters, after they have been used for their intended purpose;
- Containers that have a capacity of 30 litres or less and that were manufactured and used for the purpose of containing lubricating oil;
- Single use dry cell batteries;
- Antifreeze, and containers in which they are contained;
- Pressurized containers such as propane tanks and cylinders; and,
- Fertilizers, fungicides, herbicides, insecticides, or pesticides and containers in which they are contained.

Section 4: MHSW

In the past, municipalities participating in the program were responsible for paying all costs associated with collection and disposal of MHSW upfront, but were reimbursed for a substantial portion of those costs by Stewardship Ontario. The MOE has instructed the industry stewards that all program costs, including collection, diversion and disposal costs, will be addressed through the stewardship program.

Oil filters and antifreeze are being transitioned from this program to a separate program for automotive materials. Under the automotive program, registered transporters of oil filters, oil containers, antifreeze, and antifreeze containers will be paid an incentive for materials collected from approved sites and delivered to an approved processor. It is anticipated that this program will run primarily through commercial sites, such as gas stations, retail outlets, automotive repair shops, and municipal depots. It is uncertain how this program will work in conjunction with one day collection events.

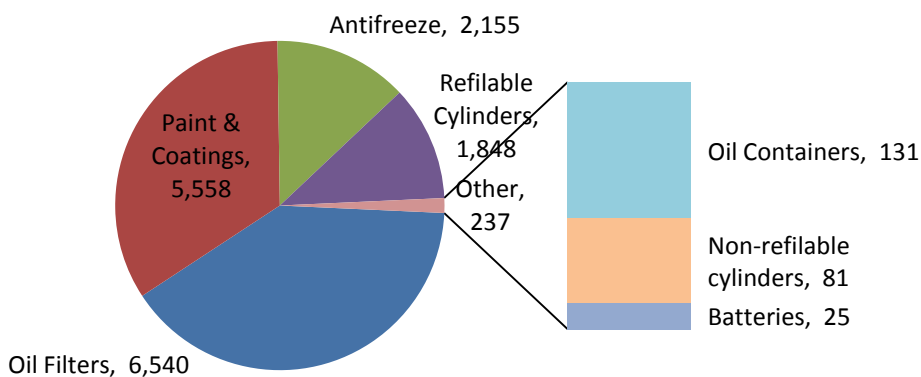
It should be noted that the amount of MHSW materials available for collection differs from the amount collected. The collected material is processed, and a portion is diverted from landfill while another portion is disposed after processing.

Section 4: MHSW

4.2 Historic Trends

4.2.1 Tonnes Diverted

Figure 4-1 Tonnes of MHSW Phase 1 Material Diverted in 2007



	Paint & Coatings	Solvents	Oil Filters	Oil Containers	Batteries	Antifreeze	Pressurized Cylinders		Fertilizers	Pesticides	Total Phase 1 Materials
							Refillable cylinders	Non-refillable cylinders			
Tonnes Diverted	5,558	-	6,540	131	25	2,155	1,848	81	-	-	16,338

Source: Stewardship Ontario, 2007

Figure 4-1 represents the tonnes of MHSW Phase 1 material diverted in 2007. This material was collected and processed through a diverse collection network comprised of private sector and municipal sector participants.

In 2007, 35% of the Phase 1 materials available for collection were collected. Twenty-eight percent of the Phase 1 materials available for collection were diverted from the landfill. The majority of the materials diverted from the landfill were metals from paint cans, pressurized cylinders, and recovered oil filters.

Section 4: MHSW

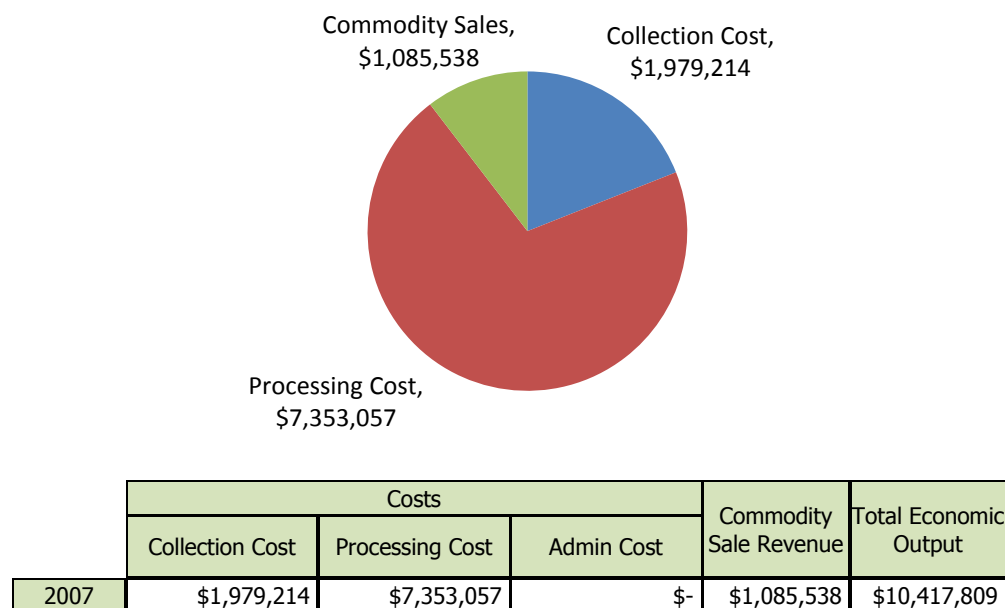
The following factors contributed to the MHSW diverted:

- 92 municipalities collected paint cans at MHSW collection events and through MHSW collection depots, collecting 51% and diverting 44% of the paint cans available for collection.
- 88 municipalities collected solvents at MHSW collection events and through MHSW collection depots, collecting 35% and diverting none of the solvents available for collection.
- 12,500 auto service outlets and 44 municipalities collected oil filters at MHSW collection events and through MHSW collection depots, collecting 38% and diverting 35% of the oil filters available for collection.
- 12,500 auto service outlets collected oil containers, collecting 6% and diverting 3% of the oil containers available for collection.
- 3,500 direct battery processor pails and 69 municipalities collected non-reusable batteries at MHSW collection events and through MHSW collection depots, collecting 5% and diverting 1% of the non-reusable batteries available for collection.
- 12,500 auto service outlets and 55 municipalities collected antifreeze at MHSW collection events and through MHSW collection depots, collecting 16% and diverting 15% of the antifreeze available for collection.
- 83 Provincial Parks with container storage, 1,000 propane exchange distributors and 68 municipalities collected refillable pressurized-cylinders at MHSW collection events and through MHSW collection depots, collecting 91% and diverting 91% of the refillable pressurized-cylinders available for collection.
- 83 Provincial Parks with container storage, and 52 municipalities collected non-refillable pressurized-cylinders at MHSW collection events and through MHSW collection depots, collecting 12% and diverting 12% of the refillable pressurized-cylinders available for collection.
- 85 municipalities collected fertilizers at MHSW collection events and through MHSW collection depots, collecting 30% and diverting none of the fertilizers available for collection.
- 87 municipalities collected pesticides at MHSW collection events and through MHSW collection depots, collecting 50% and diverting none of the pesticides available for collection.

Section 4: MHSW

4.2.2 System Costs and Revenues

Figure 4-2 Direct Economic Output Associated with Handling of MHSW Phase 1 Materials in 2007



Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4.2 depicts the direct economic output associated with handling MHSW Phase 1 materials in 2007. The direct economic output in 2007 is valued at approximately \$10,000,000. The primary economic activities responsible for this output are the collection and processing of MHSW Phase 1 materials and sale of recovered commodities. The Stewardship Ontario (MHSW) program plan did not take effect until mid-year 2008, thus there are no administrative costs and associated economic impacts in 2007.

The direct gross output associated with MHSW management:

- Approximately \$2,000,000 was spent on the collection of MHSW in 2007, this accounted for 19% of the direct economic output.
- Approximately \$7,000,000 was spent on the processing of MHSW in 2007, this accounted for 71% of the direct economic output.
- Approximately \$1,000,000 was received as revenue from commodity sales of MHSW Phase 1 material in 2007, this accounted for 10% of the direct economic output.

Section 4: MHSW

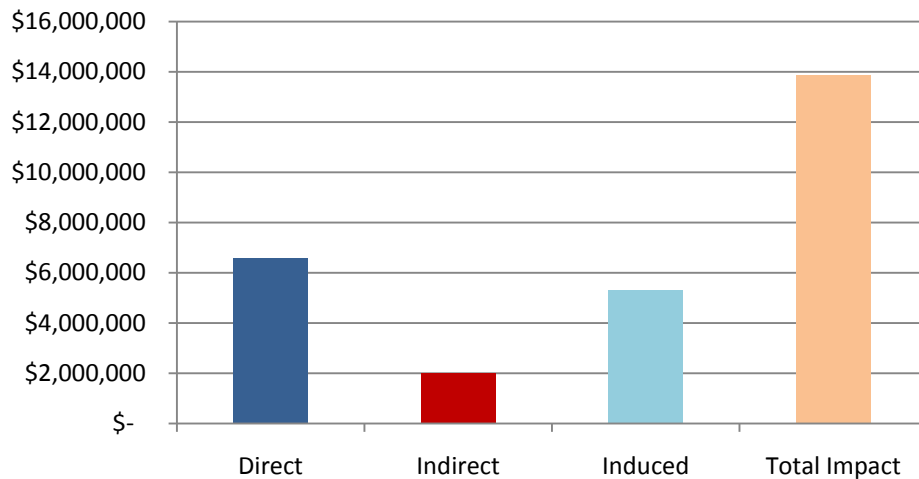
4.3 Economic Impacts

4.3.1 Current Outputs and Upstream Economic Impacts (2007)

The economic impacts of the handling MHSW Phase 1 materials in 2007 are primarily driven by the costs associated with collecting and processing the hazardous materials and the sale of recovered commodities. The economic output involved in handling MHSW Phase 1 materials results in the creation of economic value for the province of Ontario, the creation of jobs and labour income. While the majority of the economic impacts associated with MHSW management are direct, there are significant indirect and induced impacts associated with the handling of these materials as well.

The direct spending on recycling MHSW Phase 1 materials and associated commodity sales (Gross Output), creates real value in the Ontario economy by providing an environmental service that is valued by society and recovering commodities that are used as inputs into other industries. These activities create jobs that generate labour income. There are three sources of economic benefit: direct, indirect and induced.

Figure 4-3 Gross Domestic Product Attributable to MHSW Management in 2007



	Direct	Indirect	Induced	Total Impact
GDP	\$6,565,084	\$1,994,969	\$5,306,470	\$13,866,523

Source: AECOM, 2009 based on Stewardship Ontario, 2007

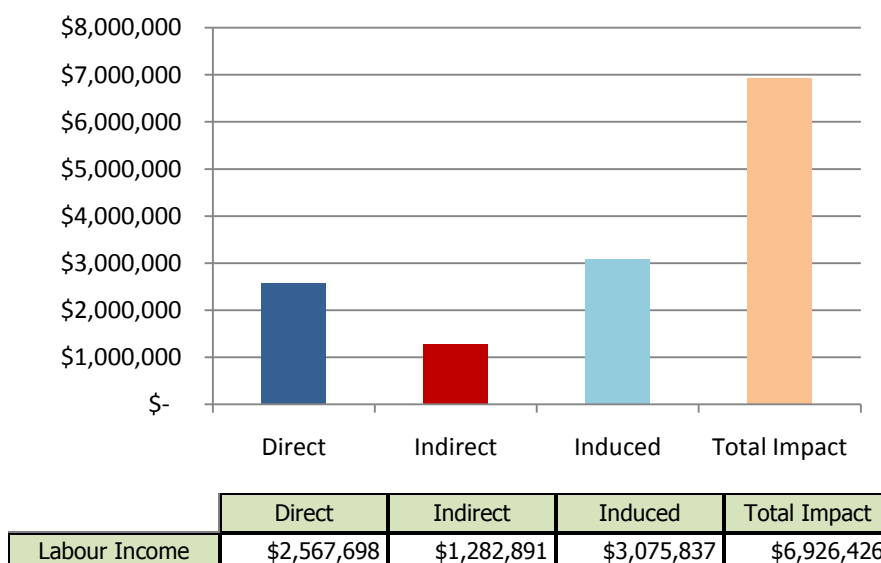
Figure 4-3 illustrates how the management of MHSW materials in 2007 created value in the Ontario economy directly, indirectly and through inducing consumer spending. Value creation is measured through the Gross Domestic Product.

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Factors influencing the creation of value in the Ontario economy include:

- The total direct and indirect value created is less than the direct economic output associated with the management of MHSW Phase 1 materials, because through inter-provincial and international imports some of the value creation associated with the direct economic output takes place outside of the province of Ontario.
- The induced spending has a large impact on gross domestic product. Consumer spending creates a virtuous circle of economic activity fueling more economic growth, and more labour income which in turn induces more economic growth.

Figure 4-4 Labour Income Attributable to MHSW Management in 2007



Source: AECOM, 2009 based on Stewardship Ontario, 2007

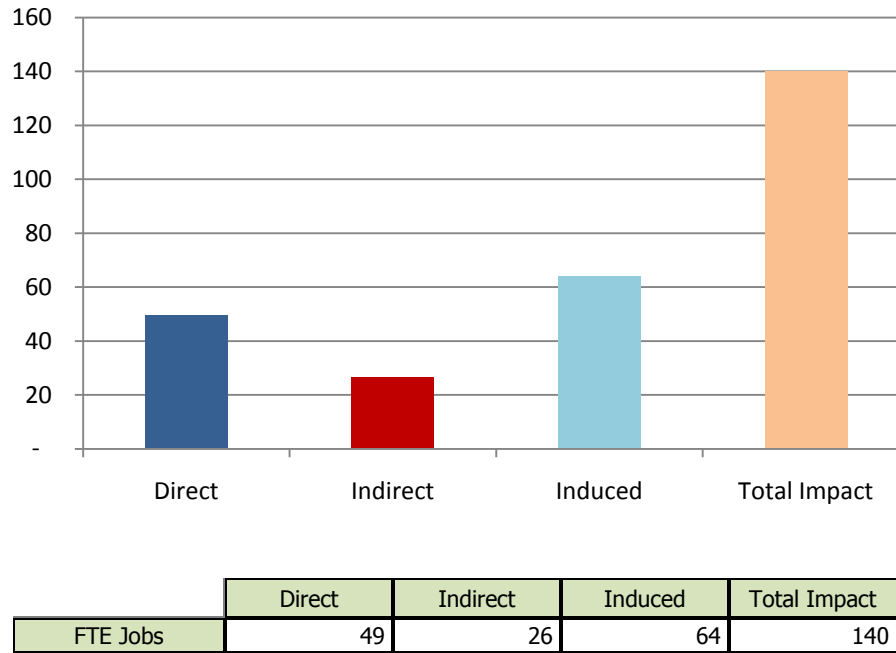
Figure 4-4 shows the labour income created in Ontario by the management of MHSW materials through direct jobs, indirect jobs and induced jobs created from the increase in consumer spending.

The labour income associated with the management of MHSW materials in 2007 is influenced by:

- The average annual labour income associated with a full-time equivalent job directly involved in the management of MHSW is approximately \$52,000
- The average annual labour income associated with a full-time equivalent job that indirectly supports the management of MHSW is approximately \$48,000
- The average annual labour income associated with a full-time equivalent job to support induced consumer spending is approximately \$48,000
- This includes wages and salaries paid to workers as well as supplementary labour income such as contributions to pension funds and workmen's compensation funds.

Section 4: MHSW

Figure 4-5 Jobs Attributable to MHSW Management in 2007



Source: AECOM, 2009 based on Stewardship Ontario, 2007

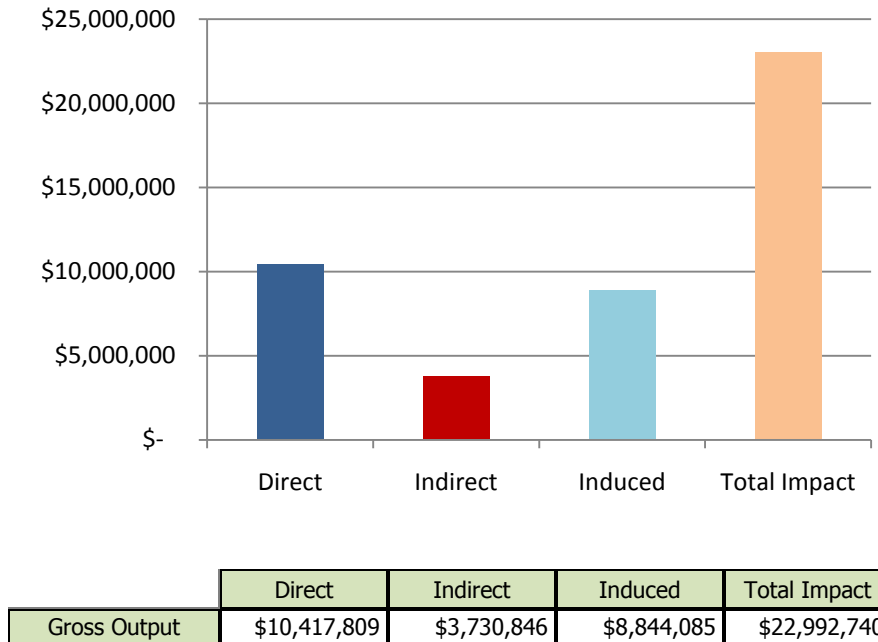
Figure 4-5 depicts the Ontario FTE employment directly and indirectly created through the management of MHSW as well through additional related induced spending. The employment related to handling MHSW Phase 1 materials is a relatively small industry directly employing only 49 people in 2007.

The indirect and induced employment associated with the management of MHSW Phase 1 Materials in 2007 relates to direct employment in the following way:

- 5 indirect jobs are created for every 10 direct jobs related to the management of MHSW
- 13 jobs are induced by additional consumer spending for every 10 jobs directly related to the management of MHSW.

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Figure 4-6 Gross Output Attributable to MHSW Management in 2007



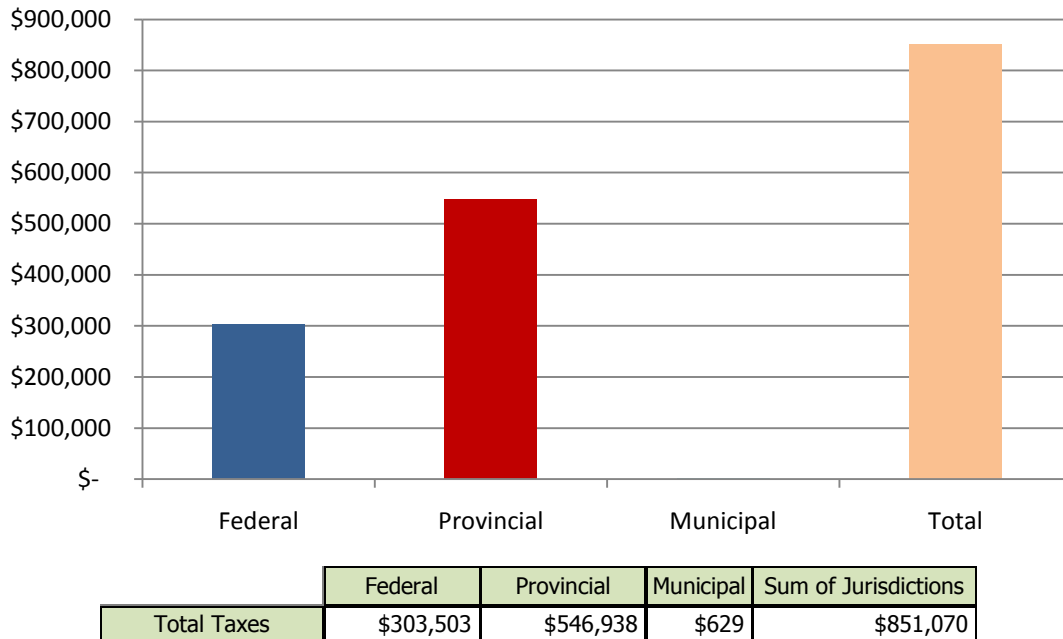
Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4-6 shows the value of Ontario's production of goods and services associated with the handling of MHSW Phase 1 materials. The value of production of goods and services is measured in Gross Output.

- Ontario's Gross Output related to MHSW management is influenced by:
- In 2007, approximately \$1,400 of total economic output was created for each tonne of MHSW phase 1 material diverted from the landfill.
- In 2007, approximately \$ 650 of direct economic output was created for each tonne of MHSW phase 1 material diverted from the landfill.
- In 2007, approximately \$ 200 of indirect economic output was created for each tonne of MHSW phase 1 material diverted from the landfill.
- In 2007, approximately \$ 550 of induced economic output was created for each tonne of MHSW phase 1 material diverted from the landfill.

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Figure 4-7 Taxes Attributable to MHSW Management in 2007



Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4-7 depicts the taxes generated by the management of MHSW Phase 1 materials in 2007 at the federal, provincial and municipal level. These taxes do not include corporate taxes, income taxes, or property taxes paid by industry and workers.

Tax associated MHSW Phase 1 material management is influenced by:

- Federal taxes are driven through payment of \$96,000 of Federal gas tax, \$13,000 of Federal duty and excise tax, \$3,000 of Federal air tax, and \$191,000 of G.S.T.
- Provincial taxes are primarily driven through payment of \$191,000 of Provincial gas tax, \$294,000 of Provincial sales tax, and \$44,000 of provincial trading profits.
- Municipal taxes are marginally impacted through small payments of municipal amusement and municipal sales taxes

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4.3.2 Downstream Economic Impacts

The management of MHSW Phase 1 materials does not produce many intermediary impacts that go on to feed into other downstream industries. Downstream recycling of Phase 1 materials in 2007 were as follows:

- Recovered paint from paint cans was used as an input to the remanufacture of recycled content paint and concrete and cement production. Recovered paint cans were recycled as scrap metal.
- Metal containers containing solvents were recycled as scrap metal.
- The majority of the metal components of collected oil filters were recycled as scrap metal.
- Steel and Zinc was recovered from batteries, and sold as scrap metal.
- Some collected antifreeze was treated and reused by some automobile service providers.
- The metal from pressurized cylinders was recycled.

A portion of the commodities recovered from MHSW Phase 1 materials flow to other Ontario Industries. The following table shows the percentages of recovered materials that are sold into the Ontario market. This data are derived from the Ontario Blue Box Markets Overview 2003/2004 (Stewardship Ontario, 2006). It is assumed that MHSW Phase 1 materials flow to end markets in the same patterns as recovered Blue Box materials. Blue Box materials are sold in Ontario directly to end users or to brokers. It is assumed that half of the materials sold to brokers in Ontario are later sold to Ontario industries.

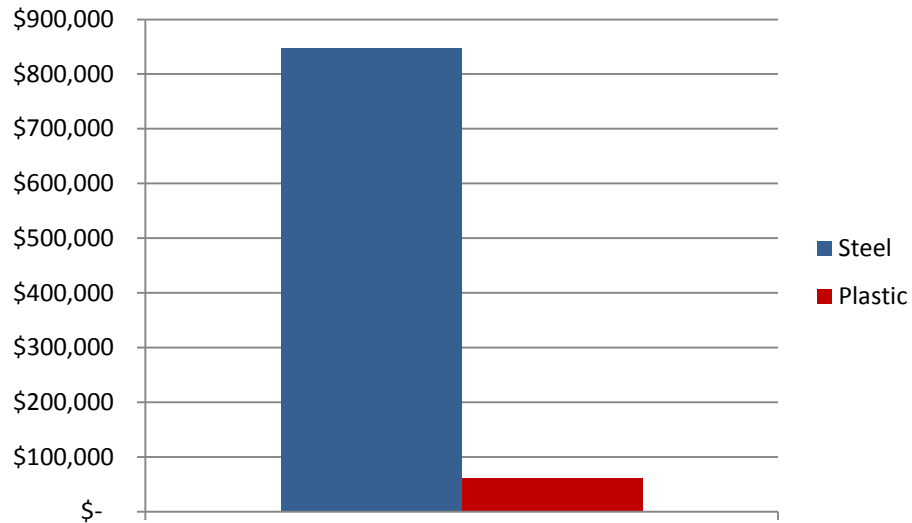
Table 4-1 Percentage of Reclaimed MHSW Phase 1 Materials Sold to Downstream to End Use Industry Sectors in Ontario (2006)

	Metals	Plastic
	Steel	HDPE
% Retained in Province	87.04	55.95

Source: AECOM, 2009 based on Stewardship Ontario, 2006 and WDO, 2007

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Figure 4-8 Value of MHSW Commodity Flows to End Use Industry Sectors in Ontario (2007)



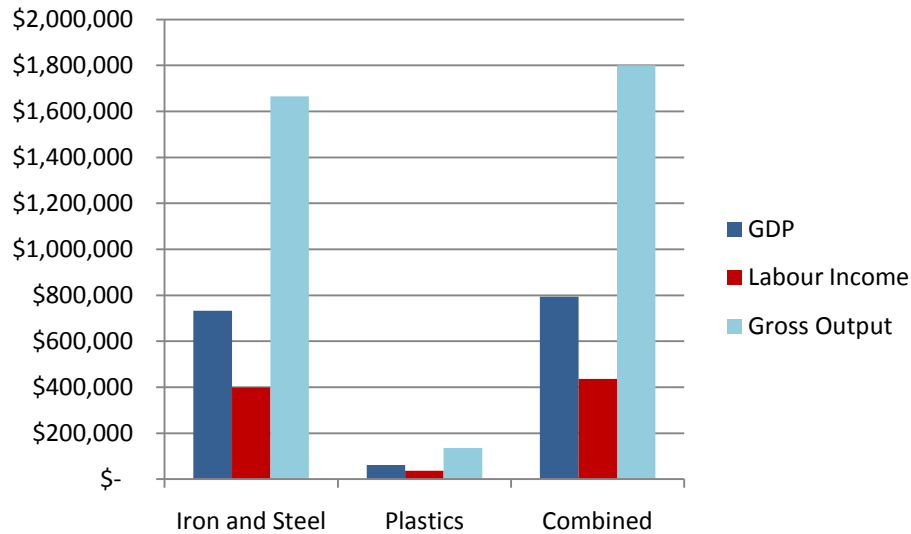
	Metals	Plastic	Sum of Commodity
	Steel	HDPE	
Total Phase 1 Materials	\$848,277	\$62,061	\$910,338

Source: AECOM, 2009 based on Stewardship Ontario, 2006, 2007 and WDO, 2007

- The dominant commodity reclaimed from MHSW Phase 1 materials being sold in Ontario is steel with sales in the order of \$850,000.
- Plastics are the other major recovered commodity that is sold with a value of \$60,000.

Section 4: MHSW

Figure 4-9 Economic Outputs from MHSW Downstream Sectors (2007) – GDP, Income and Gross Output



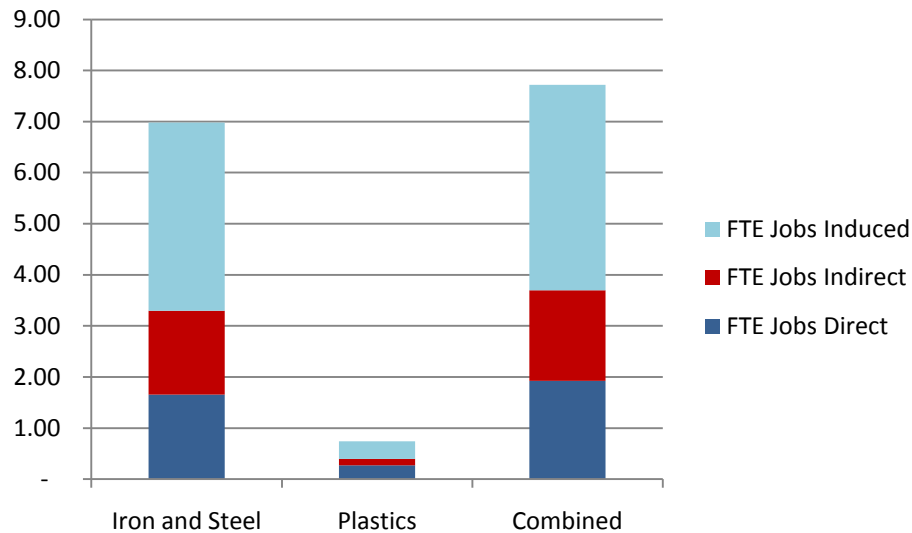
	Iron and Steel	Plastics	Combined
GDP	\$732,295	\$62,082	\$794,377
Labour Income	\$398,460	\$37,293	\$435,753
Gross Output	\$1,664,874	\$135,295	\$1,800,169

Source: AECOM, 2009 based on Stewardship Ontario, 2006, 2007 and WDO, 2007

- The economic outputs related to the processing of downstream steel reclaimed steel from MHSW Phase 1 materials accounts for the majority of the downstream benefits.
- The combined sales of steel and plastic to Ontario industries results in the creation of \$800,000 of value and approximately \$400,000 of additional labour income.

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Figure 4-10 Economic Outputs from MHSW Downstream Sectors (2007) – Jobs



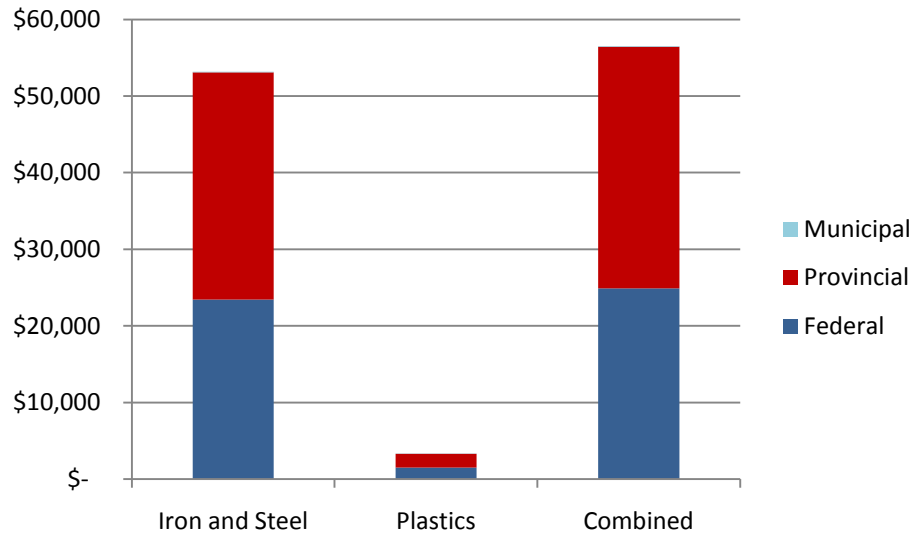
		Iron and Steel	Plastics	Combined
FTE Jobs	Direct	1.65	0.27	1.93
	Indirect	1.65	0.13	1.77
	Induced	3.68	0.34	4.02
	Total Impact	6.98	0.74	7.72

Source: AECOM, 2009 based on Stewardship Ontario, 2006, 2007 and WDO 2007

- The FTE job outputs generated by the downstream industry sectors total 8. Most of these jobs are associated with the Iron and Steel industry.

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Figure 4-11 Economic Outputs from MHSW Downstream Sectors (2007) – Taxes



	Iron and Steel	Plastics	Combined
Federal	\$23,421	\$1,498	\$24,920
Provincial	\$29,689	\$1,825	\$31,514
Municipal	\$62	\$4	\$67
Sum of Jurisdictions	\$53,173	\$3,327	\$56,500

Source: AECOM, 2009 based on Stewardship Ontario, 2006, 2007 and WDO, 2007

- The combined taxes generated by downstream industries total approximately \$53,000. The majority of these taxes are provincial (\$30,000), followed closely by federal taxes (\$23,000), with a marginal contribution from municipal taxes.

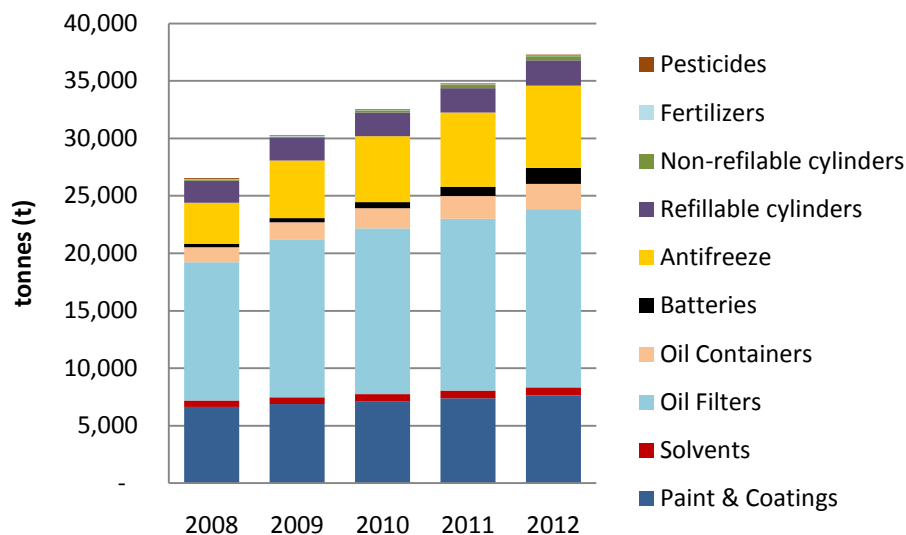
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4.4 Projections (2008 – 2012)

Stewardship Ontario (2007) forecasts diversion targets for a time period of five years, based on the best available data. Based on these forecasted diversion targets and financial data provided in the Stewardship Ontario MHSW Program Plan (2007), the following forecasts of MHSW material to be processed, economic output and economic data have been prepared.

4.4.1 Forecast of Tonnes Diverted

Figure 4-12 Projected Diversion of MHSW Phase 1 Material 2008-2012



	2008	2009	2010	2011	2012
Paint & Coatings	5,780	5,997	6,214	6,432	6,649
Solvents			62	65	68
Oil Filters	11,171	12,718	13,405	13,921	14,437
Oil Containers	670	1,209	1,749	1,967	2,186
Batteries	62	110	214	385	695
Antifreeze	3,395	4,761	5,443	6,125	6,807
Pressurized Cylinders					
Refillable cylinders	1,916	1,986	2,058	2,132	2,209
Non-refillable cylinders	96	111	185	161	341
Fertilizers			15	29	44
Pesticides					
Total Phase 1 Materials	23,090	26,892	29,345	31,217	33,436

Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4-12 depicts a forecast of MHSW Phase 1 material diverted from 2008 to 2012. This forecast is based on the continued combined municipal and private sector collection and processing of MHSW materials.

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It is forecasted that in 2012, 62% of the Phase 1 Materials available for collection will be collected. 56% of the Phase 1 materials available for collection was diverted from landfill. This is a 99% increase in the materials collected in 2007 and a 104% increase in the materials diverted.

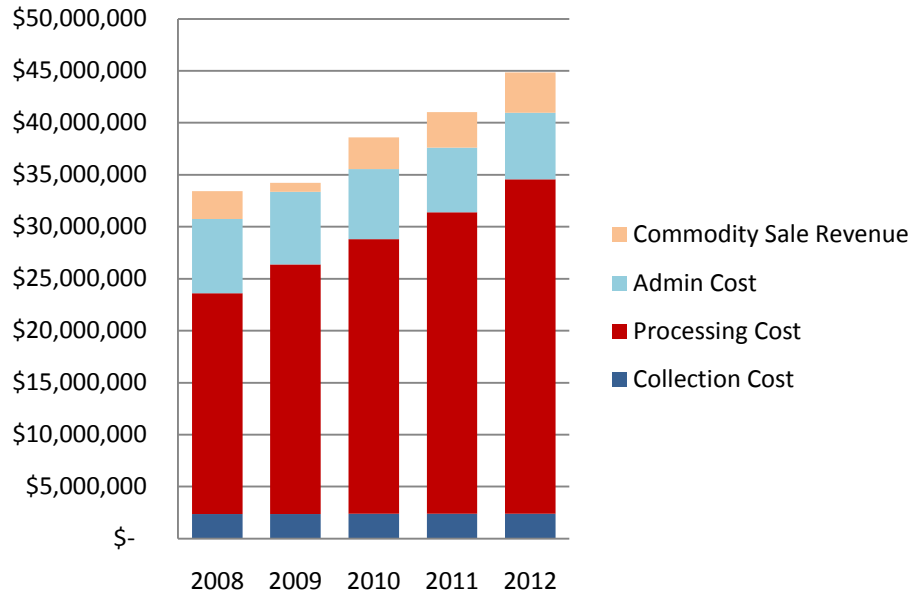
The following factors contributed to the MHSW diverted:

- Between 2007 and 2012, the percentage of paint cans available for collection collected will increase 20%, the percentage diverted will increase 20%.
- Between 2007 and 2012, the percentage of solvents available for collection collected will increase 29%, none will be diverted.
- Between 2007 and 2012, the percentage of oil filters available for collection collected and diverted will increase 121%.
- Between 2007 and 2012, the percentage of oil containers available for collection collected will increase 796%, the percentage diverted will increase 1567%.
- Between 2007 and 2012, the percentage of batteries available for collection collected will increase 468%, the percentage diverted will increase 2680%.
- Between 2007 and 2012, the percentage of antifreeze available for collection collected and diverted will increase 216%.
- Between 2007 and 2012, the percentage of pressurized refillable-cylinders available for collection collected and diverted will increase 20%.
- Between 2007 and 2012, the percentage of pressurized non-refillable-cylinders available for collection collected and diverted will increase 321%.
- Between 2007 and 2012, the percentage of pesticides available for collection collected will increase 50%, none will be diverted.
- Between 2007 and 2012, the percentage of fertilizer available for collection collected will increase 10%, none will be diverted.

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4.4.2 Forecast of System Costs and Revenues

Figure 4-13 Forecasted Direct Economic Output Associated with Handling of MHSW Phase 1 Materials 2008 - 2012



		2008	2009	2010	2011	2012
Costs	Collection Cost	\$2,368,850	\$2,375,505	\$2,383,029	\$2,389,163	\$2,396,532
	Processing Cost	\$21,223,870	\$23,994,542	\$26,427,635	\$29,008,145	\$32,162,833
	Admin Cost	\$7,141,959	\$6,984,188	\$6,741,416	\$6,209,037	\$6,404,329
Commodity Sale Revenue		\$2,701,183	\$883,035	\$3,029,836	\$3,421,652	\$3,884,136
Total Economic Output		\$33,435,862	\$34,237,270	\$38,581,916	\$41,027,998	\$44,847,830

Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4-13 shows the forecasted direct economic output associated with handling MHSW Phase 1 materials between the years 2008 - 2012. The direct economic output in 2012 is valued at over \$44,000,000. This is more than quadruple the economic output in 2007. The primary economic activities responsible for this output are the collection and processing of MHSW Phase 1 materials, the administration of the Stewardship Ontario (MHSW) program plan, and commodity sales.

The direct gross output forecast to be associated with MHSW management:

- In 2012 approximately \$2,400,000 will be spent on the collection of MHSW, this is a 21% increase beyond 2007 collection costs. Collection will account for 5% of the total economic output associated with MHSW.
- Approximately \$32,200,000 will be spent on the processing of MHSW in 2012; this is a 337% increase beyond 2007 processing costs. Processing will account for 72% of the total economic output associated with MHSW.

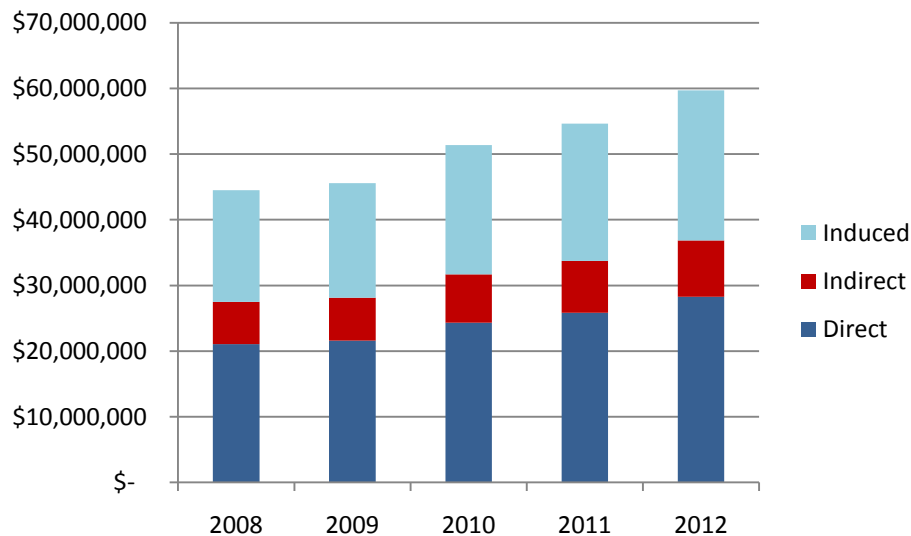
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- In 2012 roughly \$6,400,000 will be spent on the administration of the Stewardship Ontario (MHSW) program plan. This economic output did not exist in 2007. Administration of the phase 1 plan will account for 14% of the economic output.
- Approximately \$3,900,000 will be generated in commodity sales in 2012. This is a 258% increase beyond the 2007 commodity revenue. Commodity sales account for 9% of the economic output.

4.4.3 Forecast of Economic Impacts

4.4.3.1 Waste Management and Remediation Sector and Upstream Economic Impacts

Figure 4-14 Forecasted Gross Domestic Product Attributable to MHSW Management 2008 – 2012



		2008	2009	2010	2011	2012
GDP	Direct	\$21,070,578	\$21,575,609	\$24,313,513	\$25,854,982	\$28,262,161
	Indirect	\$6,402,834	\$6,556,300	\$7,388,283	\$7,856,697	\$8,588,180
	Induced	\$17,031,068	\$17,439,277	\$19,652,289	\$20,898,238	\$22,843,928
	Total Impact	\$44,504,480	\$45,571,186	\$51,354,085	\$54,609,918	\$59,694,269

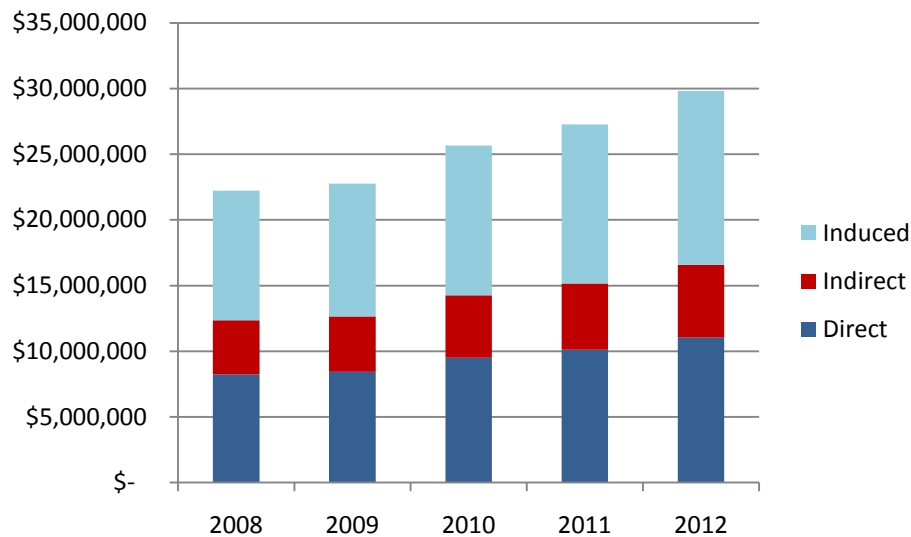
Source: AECOM, 2009 based on Stewardship Ontario, 2007

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Figure 4-14 illustrates how the management of MHSW materials is forecasted to create value between 2008-2012 Ontario economy directly, indirectly and through inducing consumer spending. Factors influencing the creation of value in the Ontario economy include:

- For every dollar of direct output from the management of MHSW phase 1 materials, \$1.33 of value is created.
- For every dollar of direct output from the management of MHSW phase 1 materials, \$0.63 of value is created directly.
- For every dollar of direct output from the management of MHSW phase 1 materials, \$0.19 of value is created indirectly.
- For every dollar of direct output from the management of MHSW phase 1 materials, \$0.51 value is induced through consumer spending.

Figure 4-15 Forecasted Labour Income Attributable to MHSW Management 2008 – 2012



		2008	2009	2010	2011	2012
Labour Income	Direct	\$8,241,004	\$8,438,528	\$9,509,362	\$10,112,253	\$11,053,734
	Indirect	\$4,117,426	\$4,216,114	\$4,751,131	\$5,052,352	\$5,522,741
	Induced	\$9,871,873	\$10,108,487	\$11,391,235	\$12,113,436	\$13,241,234
	Total Impact	\$22,230,302	\$22,763,129	\$25,651,728	\$27,278,040	\$29,817,709

Source: AECOM, 2009 based on Stewardship Ontario, 2007

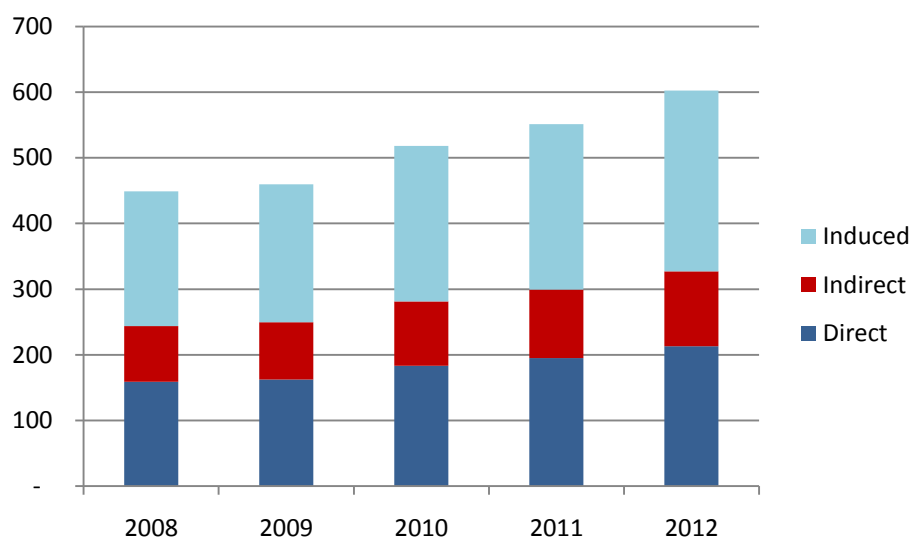
Figure 4-15 depicts the forecast of labour income created in Ontario between 2008 - 2012 through the management of MHSW Phase 1 materials through direct jobs, indirect jobs and jobs created to support the increase in consumer spending.

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The labour income forecast to be associated with the management of MHSW materials in 2012 is influenced by:

- A total of \$892 of labour income is forecasted to be created for each tonne of MHSW Phase 1 material diverted from the landfill in 2012.
- \$331 of the labour income created per tonne diverted is forecasted to be directly associated with the management of MHSW Phase 1 material.
- \$165 of the labour income created per tonne diverted is forecasted to be indirectly associated with the management of MHSW Phase 1 material.
- \$396 of the labour income created per tonne diverted is forecasted to be related to induced consumer spending associated with the management of MHSW Phase 1 material.

Figure 4-16 Forecasted full Time Equivalent employment Attributable to MHSW Management 2008 – 2012



		2008	2009	2010	2011	2012
FTE Jobs	Direct	159	163	183	195	213
	Indirect	85	87	98	104	114
	Induced	205	210	237	252	275
	Total Impact	449	460	518	551	602

Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4-16 depicts the forecast Ontario full time equivalent employment directly and indirectly created through the management of MHSW as well through additional related induced spending in 2008 – 2012. Although employment related to handling MHSW Phase 1 materials is forecasted to more than

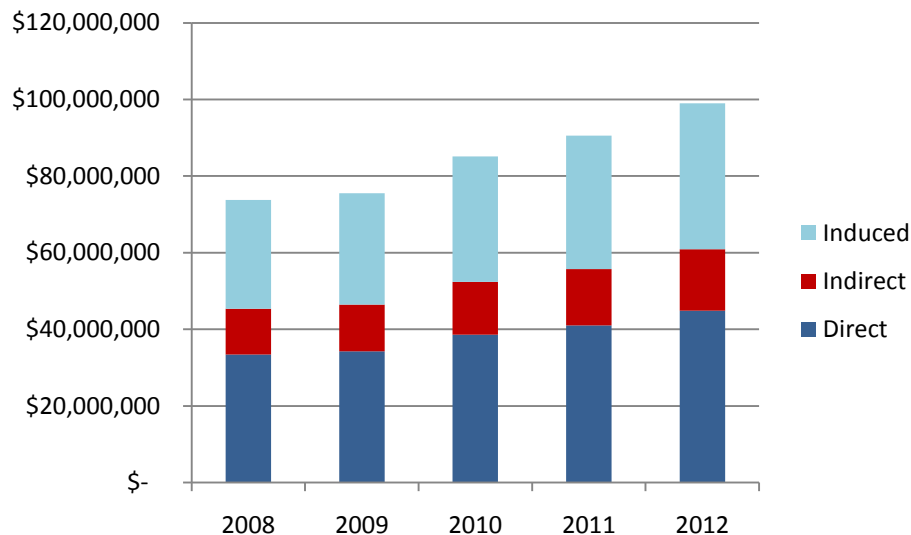
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quadruple, management of this material is forecasted to remain a relatively small industry directly employing only 213 people in 2012.

The employment associated with the management of MHSW Phase 1 materials in 2012 is influenced by:

- One direct job is forecast to be created for every 157 tonnes of MHSW Phase 1 material diverted in 2012.
- One indirect job is forecast to be created for every 293 tonnes of MHSW Phase 1 material diverted in 2012.
- One job is forecast to be induced by consumer spending for every 121 tonnes of MHSW Phase 1 material diverted in 2012.

Figure 4-17 Forecasted Gross Output Attributable to MHSW Management 2008 – 2012



		2008	2009	2010	2011	2012
Gross Output	Direct	\$33,435,862	\$34,237,270	\$38,581,916	\$41,027,998	\$44,847,830
	Indirect	\$11,974,118	\$12,261,120	\$13,817,033	\$14,693,029	\$16,060,995
	Induced	\$28,385,010	\$29,065,357	\$32,753,696	\$34,830,271	\$38,073,076
	Total Impact	\$73,794,990	\$75,563,746	\$85,152,645	\$90,551,297	\$98,981,901

Source: AECOM, 2009 based on Stewardship Ontario, 2007

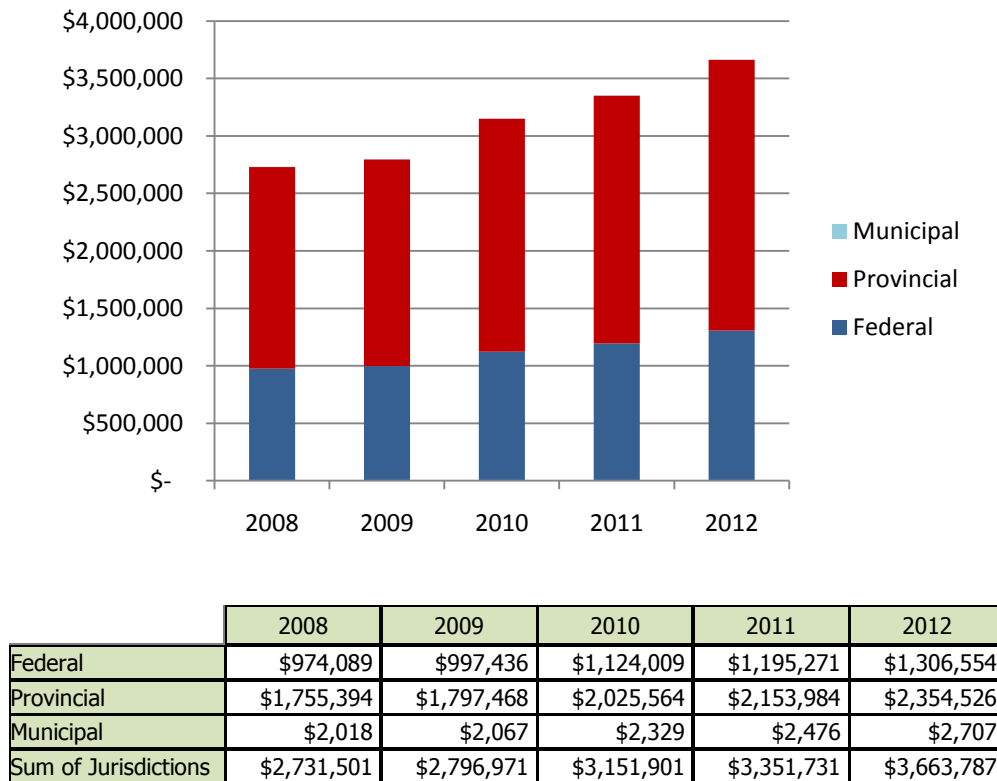
Figure 4-17 shows the forecast value of Ontario's production of goods and services associated with the handling of MHSW Phase 1 materials for 2008 – 2012.

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Ontario's forecasted Gross Output related to MHSW management is influenced by:

- In 2012, \$2,950 of total economic output is forecast to be created for each tonne of MHSW phase 1 material diverted from the landfill.
- In 2012, \$1,300 of direct economic output is forecast to be created for each tonne of MHSW phase 1 material diverted from the landfill.
- In 2012, \$500 of indirect economic output is forecast to be created for each tonne of MHSW phase 1 material diverted from the landfill.
- In 2012, \$1150 of induced economic output is forecast to be created for each tonne of MHSW phase 1 material diverted from the landfill.

Figure 4-18 Forecasted Taxes Attributable to MHSW Management from 2008 – 2012



Source: AECOM, 2009 based on Stewardship Ontario, 2007

Figure 4-18 depicts the forecasted taxes to be generated by the management of MHSW Phase 1 materials for 2008 - 2012 at the federal, provincial and municipal level. These taxes do not include corporate taxes, income taxes, or property taxes paid by industry and workers.

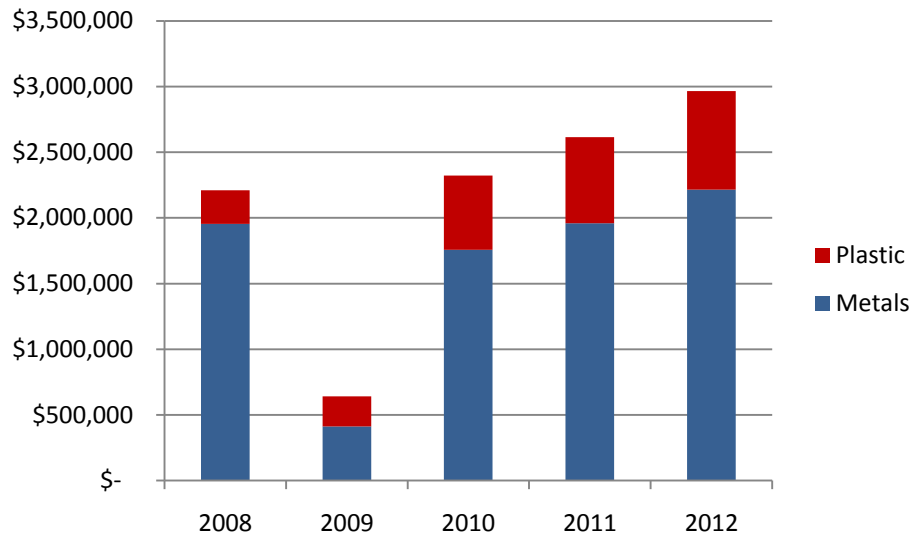
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Tax associated MHSW Phase 1 material management is influenced by:

- In 2012, Federal taxes are forecast to result in payment of \$412,000 of Federal gas tax, \$56,000 of Federal duty and excise tax, \$15,000 of Federal air tax, and \$822,000 of G.S.T.
- In 2012, Provincial taxes are forecast to result in payment of \$821,000 of Provincial gas tax, \$1,267,000 of Provincial sales tax.
- In 2012, Municipal taxes are forecast to receive a marginal contribute to through small payments of municipal amusement and municipal sales taxes.

4.4.3.2 Downstream Economic Impacts

Figure 4-19 Forecasted value of Recovered MHSW Material Flows to End Use Industry Sectors in Ontario from 2008 – 2012



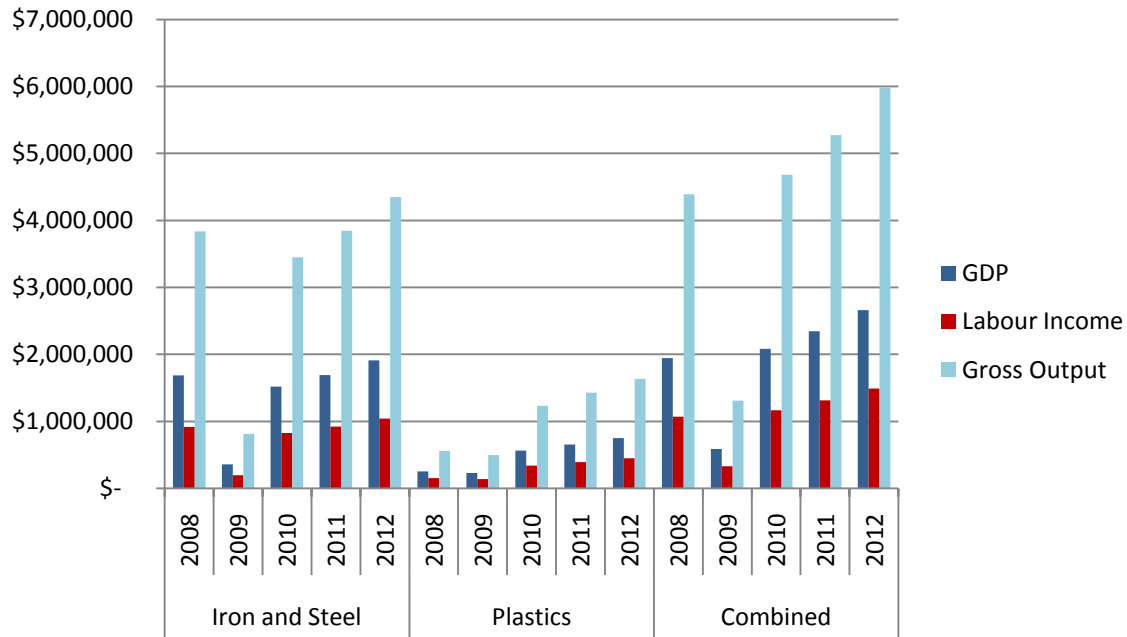
		2008	2009	2010	2011	2012
Metals	Steel	\$1,953,492	\$413,591	\$1,758,130	\$1,959,700	\$2,215,667
Plastics		\$255,558	\$228,204	\$565,047	\$654,699	\$748,920
Sum of Commodity		\$2,209,050	\$641,795	\$2,323,177	\$2,614,398	\$2,964,587

Source: AECOM, 2009 based on Stewardship Ontario 2006, 2007 and WDO, 2007

The projected value of commodities sold to end use industries in Ontario is projected in Figure 4-19 to total almost \$3 million in 2012. Metals accounts for over 75% of this value. Plastic almost triples its value between 2008 and 2012.

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Figure 4-20 Economic Outputs from MHSW Downstream Sectors from 2008 – 2012 - GDP



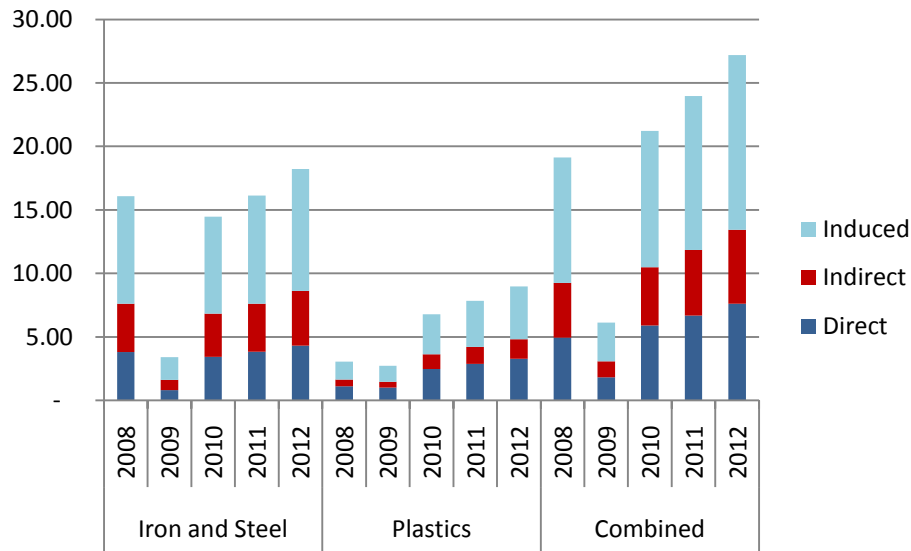
	Iron and Steel			Plastics			Combined		
	GDP	Labour Income	Gross Output	GDP	Labour Income	Gross Output	GDP	Labour Income	Gross Output
2008	\$1,686,397	\$917,611	\$3,834,027	\$255,646	\$153,568	\$557,127	\$1,942,044	\$1,071,180	\$4,391,155
2009	\$357,042	\$194,275	\$811,735	\$228,282	\$137,131	\$497,493	\$585,324	\$331,406	\$1,309,228
2010	\$1,517,747	\$825,844	\$3,450,601	\$565,241	\$339,544	\$1,231,823	\$2,082,988	\$1,165,388	\$4,682,423
2011	\$1,691,756	\$920,527	\$3,846,211	\$654,923	\$393,417	\$1,427,268	\$2,346,680	\$1,313,944	\$5,273,479
2012	\$1,912,726	\$1,040,763	\$4,348,587	\$749,177	\$450,036	\$1,632,674	\$2,661,904	\$1,490,799	\$5,981,261

Source: AECOM, 2009 based on Stewardship Ontario 2006, 2007 and WDO, 2007

- The forecasted pattern of economic outputs generated by the downstream industry sectors that purchase reclaimed MHSW Phase 1 materials is calculated using the same methodology described in section 4.3.2.
- In 2012, the steel industry is predicted to generate the largest economic impacts associated with the recycling of MHSW Phase 1 materials, followed by the plastics industry. These two sectors combined generate 2.6 million dollars of GDP, 1.5 million dollars of labour income and 6.0 million in gross output.

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Figure 4-21 Economic Outputs from MHSW Downstream Sectors from 2008 – 2012 - Jobs



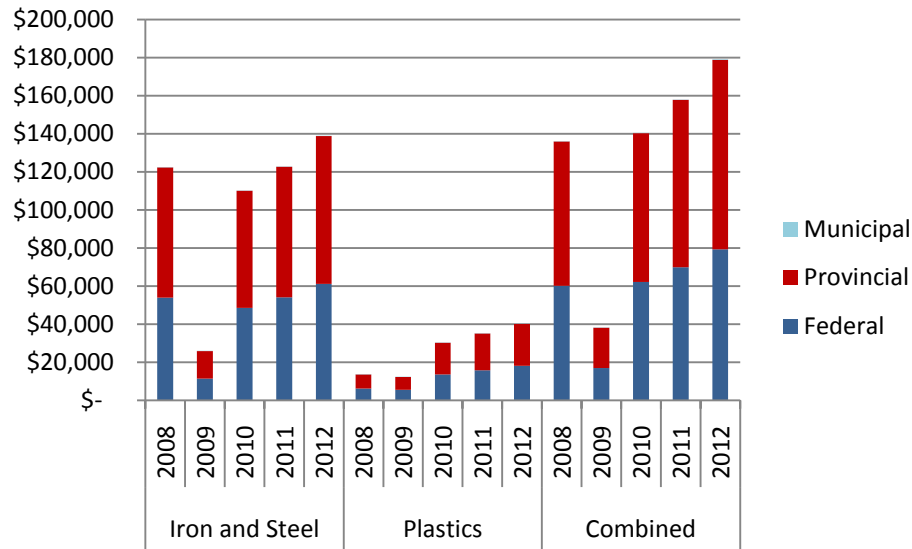
	FTE Jobs											
	Iron and Steel				Plastics				Combined			
	Direct	Indirect	Induced	Total Impact	Direct	Indirect	Induced	Total Impact	Direct	Indirect	Induced	Total Impact
2008	3.81	3.79	8.47	16.07	1.12	0.52	1.42	3.06	4.93	4.31	9.89	19.13
2009	0.81	0.80	1.79	3.40	1.00	0.47	1.27	2.73	1.81	1.27	3.06	6.14
2010	3.43	3.41	7.62	14.46	2.47	1.16	3.13	6.77	5.90	4.57	10.76	21.23
2011	3.82	3.80	8.50	16.12	2.87	1.34	3.63	7.84	6.69	5.14	12.13	23.96
2012	4.32	4.30	9.61	18.23	3.28	1.54	4.15	8.97	7.60	5.83	13.76	27.20

Source: AECOM, 2009 based on Stewardship Ontario 2006 , 2007 and WDO, 2007

- MHSW Phase 1 Material derived job outputs produced by the downstream industry sectors are projected to total not much more than 25 in 2012.

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Figure 4-22 Economic Outputs from MHSW Downstream Sectors from 2008 – 2012 - Taxes



	Iron and Steel				Plastics				Combined			
	Federal	Provincial	Municipal	Sum of Jurisdictions	Federal	Provincial	Municipal	Sum of Jurisdictions	Federal	Provincial	Municipal	Sum of Jurisdictions
2008	\$53,936	\$68,372	\$144	\$122,452	\$6,170	\$7,514	\$17	\$13,702	\$60,107	\$75,886	\$161	\$136,154
2009	\$11,419	\$14,476	\$30	\$25,925	\$5,510	\$6,710	\$15	\$12,235	\$16,929	\$21,186	\$46	\$38,161
2010	\$48,542	\$61,534	\$129	\$110,206	\$13,643	\$16,615	\$38	\$30,295	\$62,185	\$78,148	\$167	\$140,501
2011	\$54,108	\$68,589	\$144	\$122,841	\$15,808	\$19,251	\$44	\$35,102	\$69,915	\$87,839	\$188	\$157,943
2012	\$61,175	\$77,548	\$163	\$138,886	\$18,083	\$22,021	\$50	\$40,154	\$79,258	\$99,569	\$213	\$179,039

Source: AECOM, 2009 based on Stewardship Ontario 2006, 2007 and WDO 2007

- The taxes that will be generated come to just over \$179 thousand in 2012. The federal contribution is \$79 thousand, and the provincial contribution is \$100 thousand. The municipal contribution is marginal.

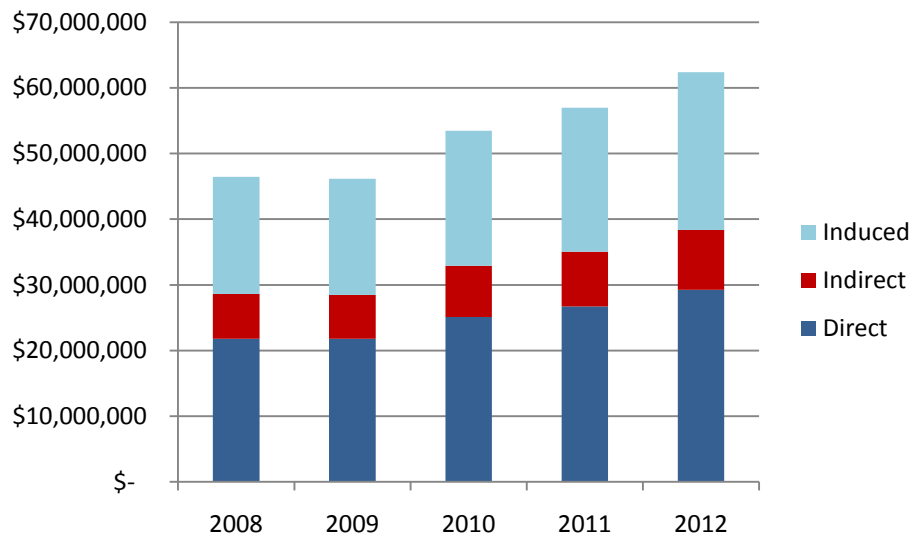
4.4.4 2008 - 2012 Combined Upstream and Downstream Economic Impacts

- In 2012, the economic output of the upstream and downstream sectors associated with the MHSW Phase program is projected to be \$105 million.
- The Gross Domestic Product (GDP) impact is anticipated to be \$62 million and of this sum, 47% will be attributable to direct effects, 15% to indirect effects and 38% to induced income spending by direct and indirect labour (Figure 4-23).
- Labour Income generated from the direct Gross Output is expected to be \$31 million and of this sum, 39% will be accounted for by direct employment, 19% by indirect employment and 42% by induced employment (Figure 4-24).

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- The 2012 upstream and downstream impacts of MHSW program are expected to create in 630 FTE jobs in the Ontario economy (Figure 4-25).
- Of this total number of jobs, 221 FTE jobs will be directly created and 120 indirectly created.
- Approximately 289 additional induced FTE jobs will also be created in the economy through the income spending of direct and indirect employees in the upstream and downstream sectors.
- Tax revenues spawned by the 2012 MHSW in upstream and downstream sectors are projected to total \$3.8 million (Figure 4-27).

Figure 4-23 Economic Outputs from MHSW Combined Upstream and Downstream Sectors – GDP (2008 - 2012)

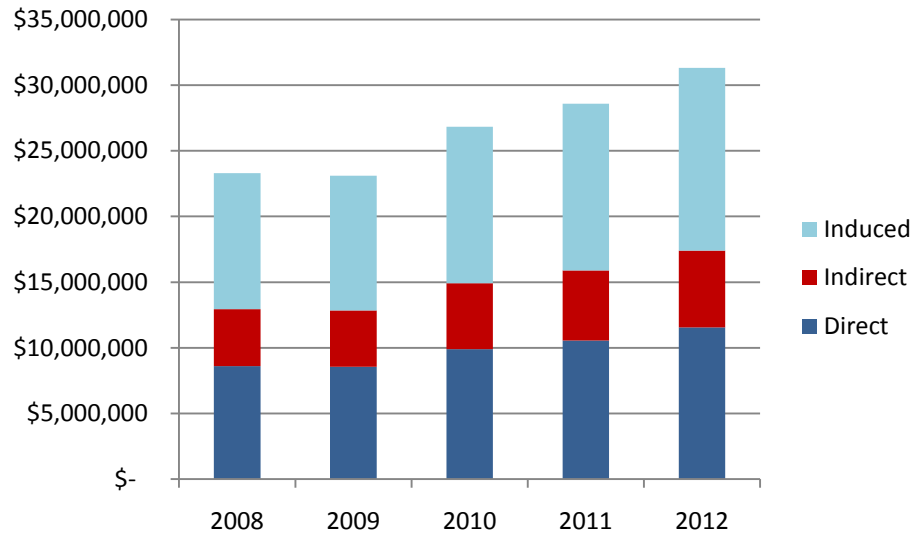


		2008	2009	2010	2011	2012
GDP	Direct	\$21,796,162	\$21,791,311	\$25,086,010	\$26,724,915	\$29,248,825
	Indirect	\$6,798,642	\$6,672,025	\$7,805,946	\$8,326,807	\$9,121,290
	Induced	\$17,851,720	\$17,693,174	\$20,545,116	\$21,904,877	\$23,986,058
	Total Impact	\$46,446,524	\$46,156,510	\$53,437,072	\$56,956,598	\$62,356,173

Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 4-24 Economic Outputs from MHSW Combined Upstream and Downstream Sectors – Labour Income (2008 - 2012)

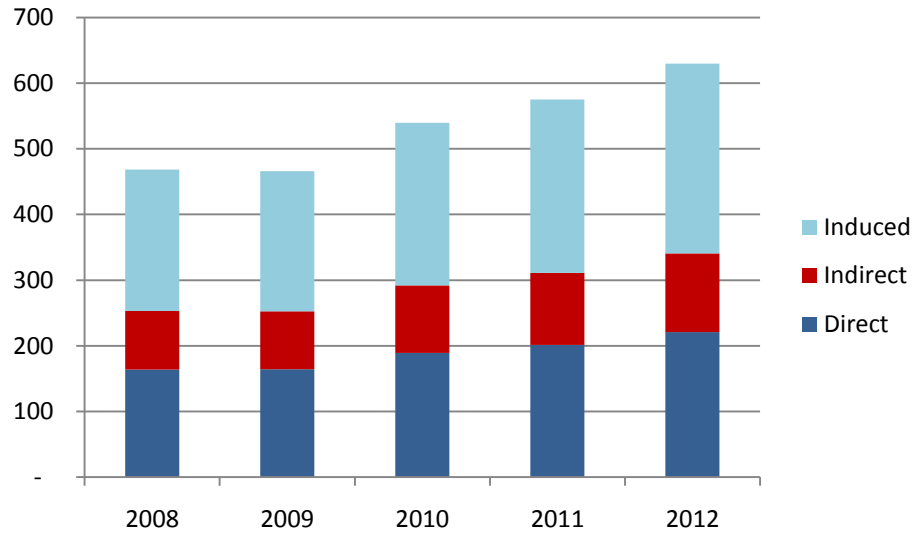


		2008	2009	2010	2011	2012
Labour Income	Direct	\$8,599,819	\$8,552,871	\$9,906,144	\$10,560,008	\$11,561,893
	Indirect	\$4,354,109	\$4,286,010	\$5,002,220	\$5,335,054	\$5,843,358
	Induced	\$10,347,554	\$10,255,655	\$11,908,752	\$12,696,922	\$13,903,257
	Total Impact	\$23,301,482	\$23,094,536	\$26,817,116	\$28,591,984	\$31,308,508

Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 4-25 Economic Outputs from MHSW Combined Upstream and Downstream Sectors – FTE Jobs (2008 - 2012)

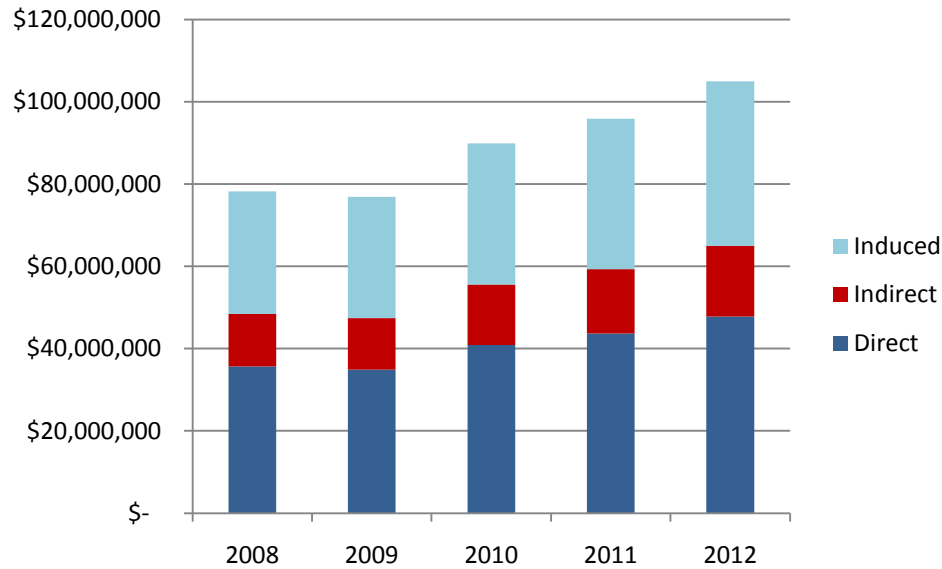


		2008	2009	2010	2011	2012
FTE Jobs	Direct	164	164	189	202	221
	Indirect	89	88	103	109	120
	Induced	215	213	248	264	289
	Total Impact	468	466	539	575	630

Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 4-26 Economic Outputs from MHSW Combined Upstream and Downstream Sectors – Gross Output (2008 - 2012)

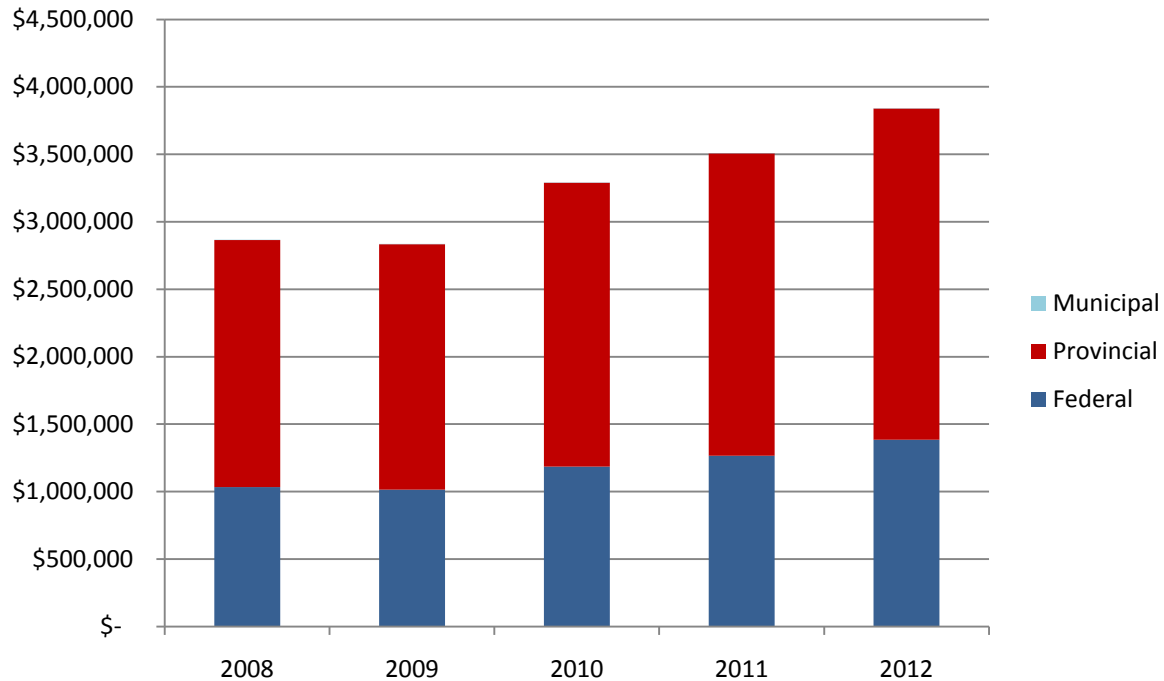


		2008	2009	2010	2011	2012
Gross Output	Direct	\$35,644,912	\$34,879,065	\$40,905,093	\$43,642,396	\$47,812,417
	Indirect	\$12,788,474	\$12,505,394	\$14,688,240	\$15,674,385	\$17,174,125
	Induced	\$29,752,758	\$29,488,516	\$34,241,736	\$36,507,995	\$39,976,619
	Total Impact	\$78,186,145	\$76,872,975	\$89,835,068	\$95,824,776	\$104,963,161

Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 4-27 Economic Outputs from Combined Upstream and Downstream Sectors – Taxes (2008 - 2012)



	2008	2009	2010	2011	2012
Federal	\$1,034,196	\$1,014,365	\$1,186,194	\$1,265,186	\$1,385,812
Provincial	\$1,831,280	\$1,818,654	\$2,103,712	\$2,241,823	\$2,454,095
Municipal	\$2,179	\$2,112	\$2,496	\$2,664	\$2,920
Sum of Jurisdictions	\$2,867,655	\$2,835,132	\$3,292,402	\$3,509,674	\$3,842,827

Source: AECOM 2009, Based on Statistics Canada, 2009

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5. WEEE

5.1 WEEE Program Description

Ontario Electronic Stewardship (OES) is the designated IFO for the Waste Electrical and Electronic Equipment (WEEE) program. The program submission by OES was approved by the Ministry July 10, 2008, and began collecting materials in the spring of 2009. In 2007, prior to the start of the OES plan, Phase 1 materials were still collected, processed, reused and refurbished and diverted from landfills. The 2007 baseline data captures the impacts prior to the start of the plan. This report is based on data from the WEEE plan that assumes the program began in 2008, for forecasting purposes (OES, 2008).

Under the program, OES will support both recycling and reuse programs. Approved agencies collecting WEEE will receive \$165 per tonne of WEEE that has been prepared for OES transportation. Alternately, the cost of an OES operated one day events will be fully covered by the steward. Reuse organizations will receive support through promotions of programs, and by offering them the opportunities to act as approved collection agents and receive the fees for properly prepared WEEE. Collection agents can include not only reuse organizations, but second hand material collection organizations, municipalities, recycling companies, and mobile events where required.

As with WEEE, it should be noted that only some of the material available for collection is collected. A fraction is collected, while another fraction is reused or refurbished, and any remainders are disposed by conventional means. Of the material that is collected, 100% of that material is processed, and a further portion of that is diverted while the remainder is disposed.

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5.1.1 WEEE Phase 1 Materials

The first phase of the program targets the following materials:

Table 5-1 Designated WEEE Phase 1 Materials

Material Classification	Included Equipment
Desktop Computers	Personal Computer (Desktop) Computer terminals Microcomputer Minicomputer
Portable Computers	Personal Computer (Laptop) Personal Computer (Notebook) Personal Computer (Notepad)
Computer Peripherals	CD-ROM drive Computer disk drive Computer mouse Computer keyboard
Monitors	Monitor (CRT) Monitor (LCD) Monitor (Plasma)
Printers	Printer Fax machine
Televisions	Television (CRT) Television (LCD) Television (Plasma) Television (Rear Projection)

Source: OES, 2008

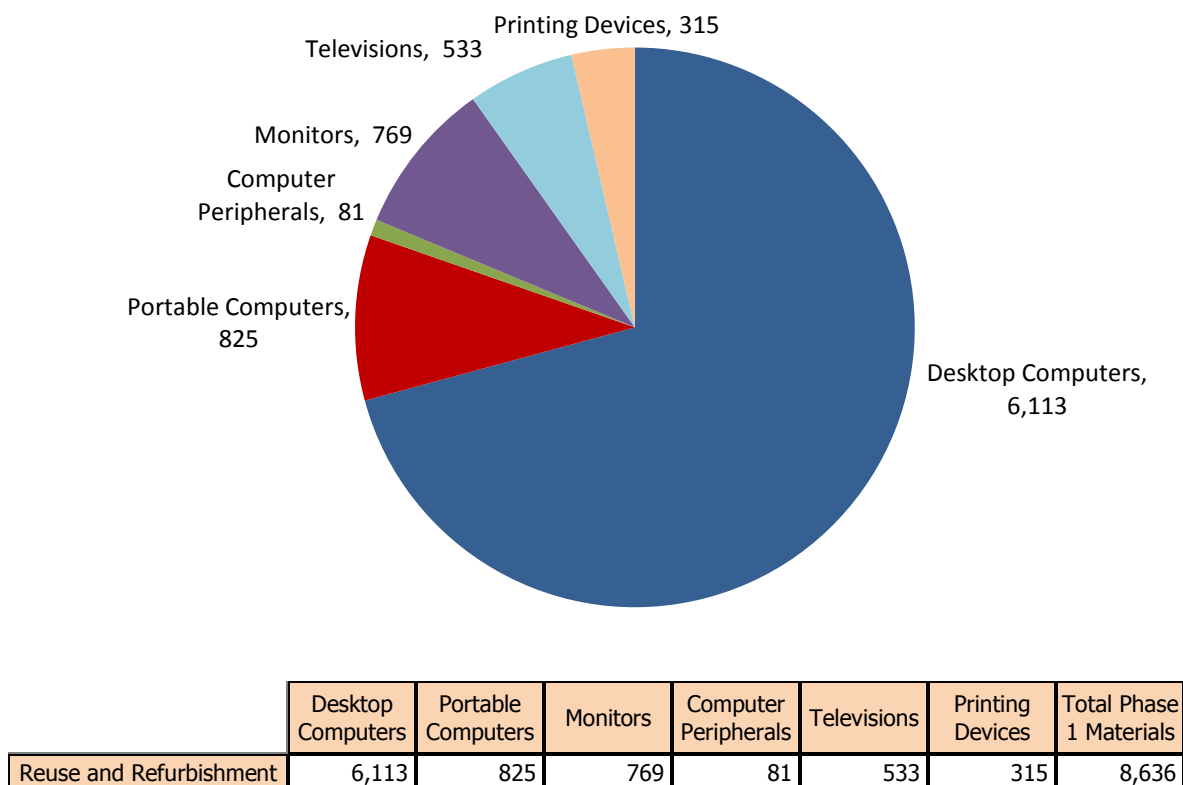
Additional materials such as phones, cameras and audiovisual equipment will follow one year after approval of the first phase.

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5.2 WEEE Historic Trends

5.2.1 Tonnes Reused or Refurbished

Figure 5-1 Tonnes of WEEE Phase 1 Material Reused or Refurbished in 2007



Source: OES, 2008

Figure 5-1 represents the tonnes of WEEE Phase 1 material that was reused or refurbished in 2007. This material was collected, refurbished and the material's lifespan extended through a wide range of for-profit and not-for-profit organizations. In 2007, 9% of the Phase 1 materials available for collection were reused or refurbished. The vast majority of the Phase 1 materials reused and refurbished were desktop computers, portable computers, and computer peripherals.

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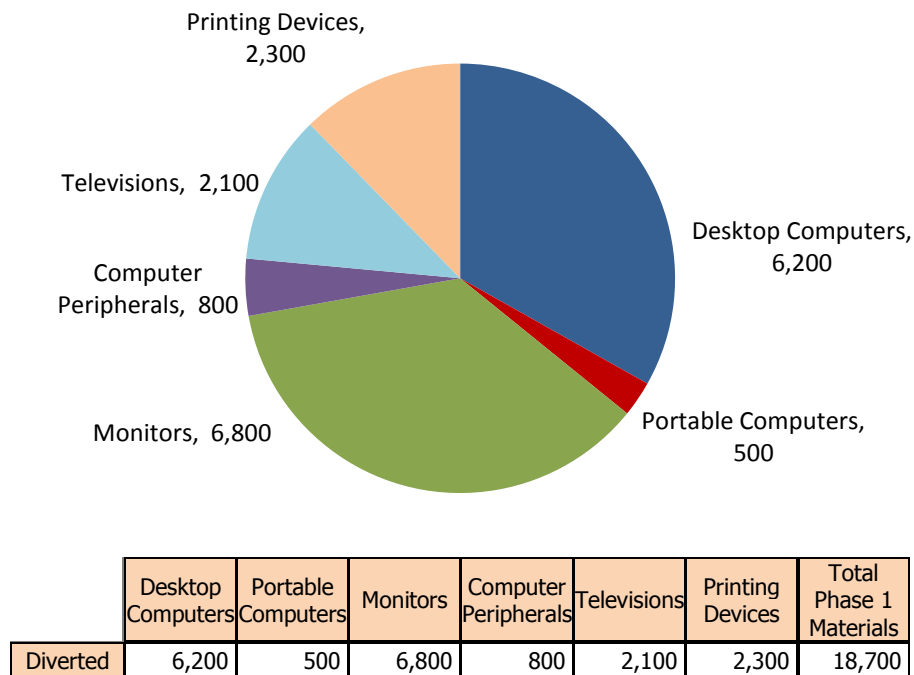
The following factors contributed to the amount of WEEE Reused or Refurbished:

- 5% - 10% of the residential WEEE Phase 1 material collected was reusable.
- 50% - 65% of the IC&I WEEE Phase 1 material collected were reusable.
- 16 identified WEEE processing companies practiced some form of reuse and refurbishment.
- Around 70 not-for-profit organizations participated in WEEE material collection, many of which reuse and refurbish WEEE Phase 1 materials. These organizations often focus on using electronic equipment for social purposes.
- 38% of the desktop computers available for collection were reused or refurbished.
- 23% of the portable computers available for collection were reused or refurbished.
- 12% of the monitors available for collection were reused or refurbished.
- 5% of the computer peripherals available for collection were reused or refurbished.
- 1% of the televisions available for collection were reused or refurbished.
- 3% of the printing devices available for collection were reused or refurbished.

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5.2.2 Tonnes Diverted

Figure 5-2 Tonnes of WEEE Phase 1 Material Diverted in 2007



Source: OES, 2008

Figure 5-2 represents the tonnes of WEEE Phase 1 materials that were diverted in 2007. This material was collected through retailer take back programs and special events, municipal collection sites and events, and other not for profit WEEE collection programs. Ontario currently has capacity to process 170,000 tonnes of WEEE Phase 1 material.

In 2007, 27% of the Phase 1 materials available for collection were collected and 21% of the Phase 1 materials available for collection were diverted from the landfill. The materials diverted from the landfill primarily were metals recovered from all Phase 1 WEEE materials.

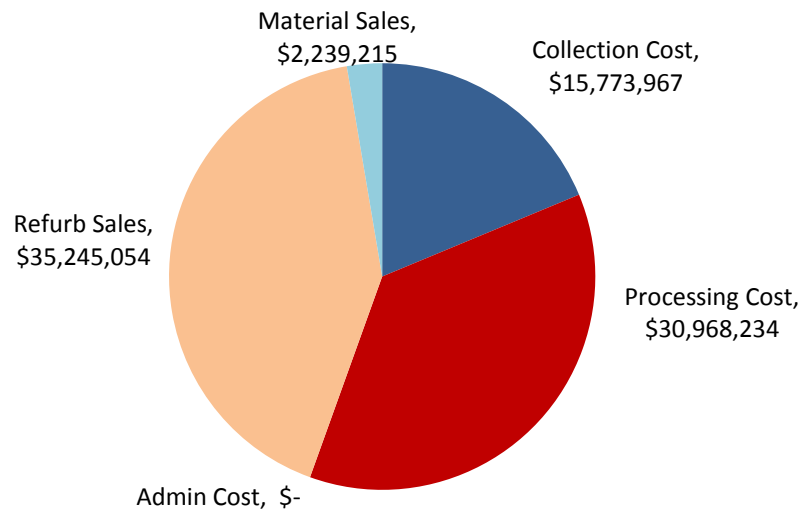
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The following factors contributed to the WEEE diverted:

- 50% of desktop computers available for collection were collected and processed, 38% were diverted from landfill.
- 32% of portable computers available for collection were collected and processed, 23% were diverted from landfill.
- 59% of monitors available for collection were collected and processed, 44% were diverted from landfill.
- 37% of computer peripherals available for collection were collected and processed, 30% were diverted from landfill.
- 6% of televisions available for collection were collected and processed, 5% were diverted from landfill.
- 30% of printing devices available for collection were collected and processed, 22% were diverted from landfill.

5.2.3 System Costs and Revenues

Figure 5-3 Direct Economic Output Associated with Handling of Phase 1 WEEE Materials in 2007



	Costs			Revenue		Total Economic Output
	Collection Cost	Processing Cost	Admin Cost	Refurbishment/Reuse Sales	Recovered Material Sales	
2007	\$15,773,967	\$30,968,234	\$-	\$35,245,054	\$2,239,215	\$84,226,470

Source: AECOM 2009, based on OES, 2008

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Figure 5-3 depicts the direct economic output associated with managing WEEE Phase 1 materials in 2007. The direct economic output in 2007 was valued at approximately \$84,000,000. The OES WEEE program plan was approved on July 10, 2008 and began in April 2009, thus there was no material administrative cost contributing to the economic impact in 2007.

Quite interestingly, revenue or output from refurbishment and reuse programs is an extremely significant economic output. The value of refurbishment sales is estimated at \$35,200,000. By researching commercial and resale websites, it was observed that the value of reuse and refurbishment is normally around 30%. Therefore, a very conservative calculation was used by taking 5% of the minimum typical consumer price paid for different types of WEEE materials and using the reference weight specified in the WEEE program plan to come up with a price per tonne of reused or refurbished materials. This unit price and the tonnage of material reused and refurbished was used to calculate the value of the refurbished and reused Phase 1 material.

Although using an estimate of 5% of the minimum consumer price paid is conservative, it is appropriate as it recognizes the importance of refurbished sales, but it does not allow them to dominate the economic analysis. Doubling the estimated value of reused and refurbished materials to 10% of the minimum consumer price paid would lead to refurbishment sales accounting for almost two thirds of the economic value from the WEEE program. Before making any such statements further in depth study of the reuse and refurbishment industry is required.

Table 5-2 WEEE Phase 1 Material Value of Reuse and Refurbishment Assumptions

	Min Typical Consumer Price	Max Typical Consumer Price	Average Typical Consumer Price	Retained Value after refurbishment	Minimum Refurbishment Value / unit	Maximum Weight (kg) / unit	Units / t	Refurbished Unit value / t
Desktop Computers	\$550	\$1,000	\$775	5.00%	\$28	7.4	135	\$3,716
Portable Computers	\$800	\$3,000	\$1,900	5.00%	\$40	2.9	345	\$13,793
Monitors	\$200	\$1,700	\$950	5.00%	\$10	13.6	74	\$735
Computer Peripherals	\$20	\$180	\$100	5.00%	\$1	0.3	3,333	\$3,333
Televisions	\$210	\$7,000	\$3,605	5.00%	\$11	46.9	21	\$224
Printing Devices	\$80	\$330	\$205	5.00%	\$4	6.5	154	\$615

Source: AECOM 2009, based on OES, 2008

The direct gross output associated with WEEE management is influenced by:

- Approximately \$15,800,000 was spent on the collection of WEEE in 2007, which accounts for 19% of the direct economic output.
- Approximately \$31,000,000 was spent on the processing of WEEE in 2007, which accounts for 37% of the direct economic output.

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- Approximately \$35,200,000 of economic output was created through reuse and refurbishment of WEEE phase 1 materials in 2007, which accounts for 42% of the direct economic output.
- Approximately \$2,200,000 of economic output was created through reuse and refurbishment of WEEE phase 1 materials in 2007, which accounts for 3% of the direct economic output.

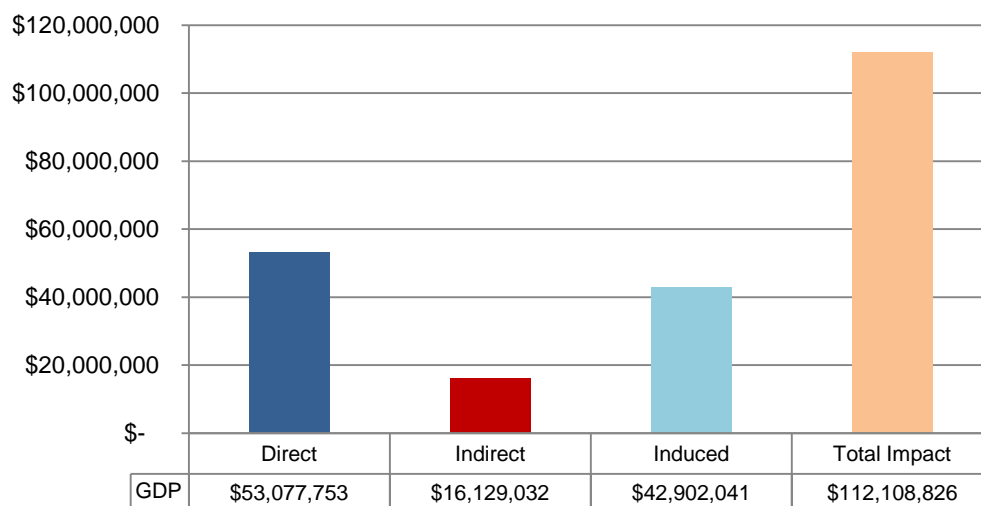
5.3 WEEE Economic Impacts

5.3.1 Current Outputs and Upstream Economic Impacts (2007)

The economic impact of the handling WEEE Phase 1 materials in 2007 was driven by three major factors: the costs associated with collection, the costs associated with processing materials and the value of material reused and refurbished. The economic output involved in managing WEEE Phase 1 materials, results in the creation of economic value for the province of Ontario, the creation of jobs and labour income. While the majority of the economic impacts associated with WEEE management are direct, there are significant indirect and induced impacts associated with the handling of these materials as well.

The direct spending on recycling WEEE Phase 1 materials and associated refurbished equipment sales and recovered material sales (Gross Output), creates real value in the Ontario economy by providing an environmental service that is valued by society, extending the life of electronic equipment and recovering commodities that are used as inputs into other industries. These activities create jobs that generate labour income.

Figure 5-4 Gross Domestic Product Attributable to WEEE Management in 2007



Source: AECOM, 2009, based on OES, 2008

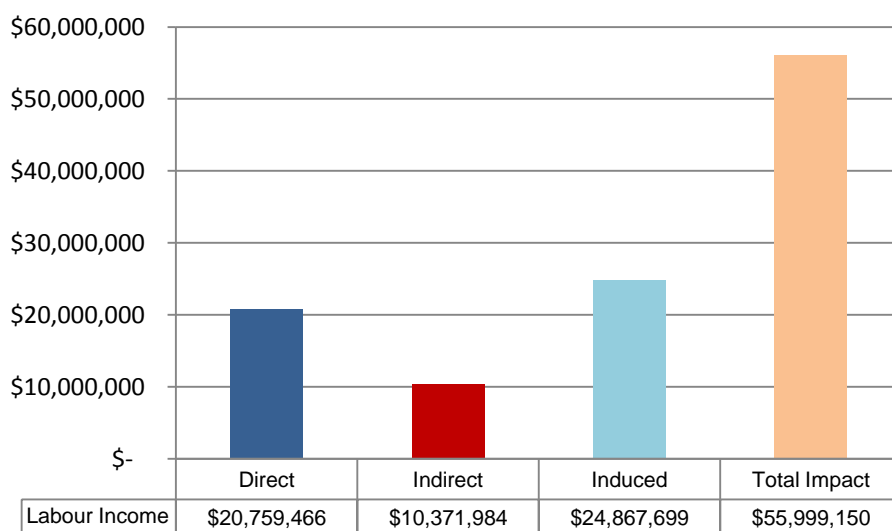
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Figure 5-4 illustrates how the management of WEEE Phase 1 material in 2007 created value in the Ontario economy directly, indirectly and through inducing consumer spending. Value creation is measured through the Gross Domestic Product.

Factors influencing the creation of value in the Ontario economy include:

- \$5,995 of total value is created for every tonne of WEEE Phase 1 material diverted from the landfill.
- \$2,838 of value is directly created by industries involved in the management of WEEE phase 1 material for every tonne of material diverted from the landfill.
- \$863 of value is indirectly created by industries that support the management of WEEE phase 1 material for every tonne of material diverted from the landfill.
- \$2,294 of value is created by consumer spending induced by management of WEEE phase 1 material for every tonne of material diverted from the landfill.

Figure 5-5 Labour Income Attributable to WEEE Management in 2007



Source: AECOM, 2009, based on OES, 2008

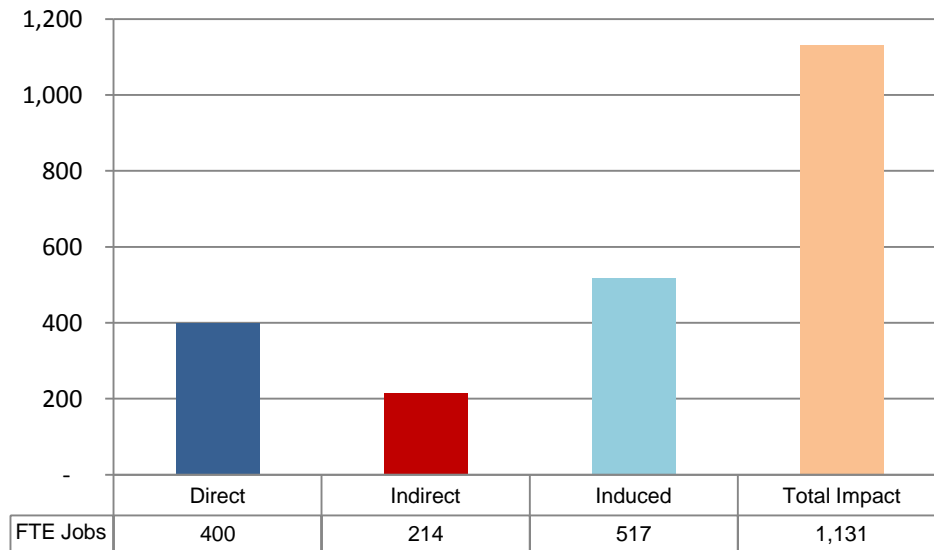
Figure 5-5 shows the labour income created in Ontario by the management of WEEE materials through direct jobs, indirect jobs and jobs created to support the increase in consumer spending. The labour income associated with the management of WEEE materials in 2007 is influenced by:

- A total of \$2,995 of labour income is created for each tonne of WEEE Phase 1 material diverted from the landfill in 2012.
- \$1,110 of the labour income created per tonne diverted is directly associated with the management of WEEE Phase 1 material.

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- \$555 of the labour income created per tonne diverted is indirectly associated with the management of WEEE Phase 1 material.
- \$1,330 of the labour income created per tonne diverted is related to induced consumer spending associated with the management of WEEE Phase 1 material.

Figure 5-6 Jobs Attributable to WEEE Management in 2007



Source: AECOM, 2009 based on OES, 2008

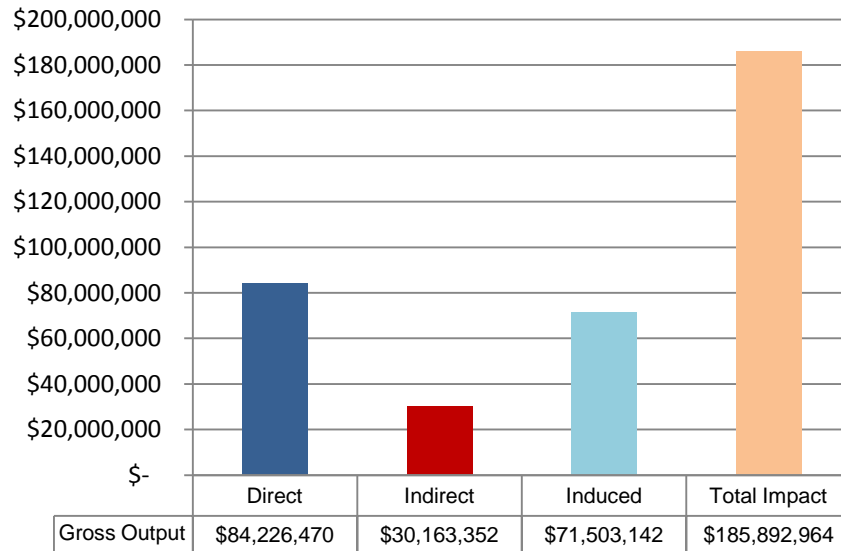
Figure 5-6 depicts the Ontario full time equivalent employment (FTE) directly and indirectly created through the management of WEEE as well through additional related induced spending.

The employment associated with the management of WEEE Phase 1 materials in 2007 is influenced by:

- One job associated with WEEE Phase 1 material management was created for every 17 tonnes of material diverted from the landfill.
- One direct job managing WEEE Phase 1 material was created for every 47 tonnes of material diverted from the landfill.
- One indirect job managing WEEE Phase 1 material was created for every 87 tonnes of material diverted from the landfill.
- One job was created to support induced spending related to the management of WEEE phase 1 materials for every 36 tonnes of material diverted from the landfill.

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Figure 5-7 Gross Output Attributable to WEEE Management in 2007



Source: AECOM, 2009 based on OES, 2008

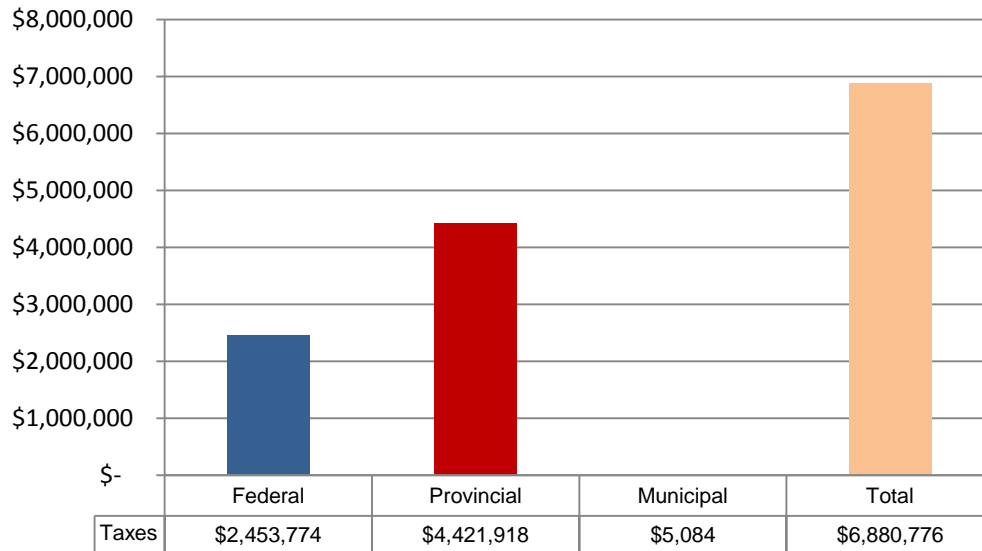
Figure 5-7 shows the value of Ontario's production of goods and services associated with the handling of WEEE Phase 1 materials. The value of production of goods and services is measured in Gross Output.

Ontario's Gross output related to WEEE phase 1 material management is influenced by:

- In 2007, approximately \$9,941 of total economic output was created for each tonne of WEEE Phase 1 material diverted from the landfill.
- In 2007, approximately \$ 4,504 of direct economic output was created for tonne of WEEE Phase 1 material diverted from the landfill.
- In 2007, approximately \$ 1,613 of indirect economic output was created for tonne of WEEE Phase 1 material diverted from the landfill.
- In 2007, approximately \$ 3,824 of induced economic output was created for tonne of WEEE Phase 1 material diverted from the landfill.

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Figure 5-8 Taxes Attributable to WEEE Management in 2007



Source: AECOM, 2009 based on OES, 2008

Figure 5-8 depicts the taxes generated by the management of WEEE Phase 1 materials in 2007 at the federal, provincial and municipal level. These taxes do not include corporate taxes, income taxes, or property taxes paid by industry and workers.

Tax associated WEEE Phase 1 material management is influenced by:

- Federal taxes are driven through payment of \$774,000 of Federal gas tax, \$106,000 of Federal duty and excise tax, \$28,000 of Federal air tax, and \$1,543,000 of G.S.T.
- Provincial taxes are primarily driven through payment of \$1,542,000 of Provincial gas tax, \$2,377,000 of Provincial sales tax, and \$352,000 of Provincial trading profits.
- Municipal taxes are marginally contributed to through small payments of municipal amusement and municipal sales taxes

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5.3.2 Downstream Impacts

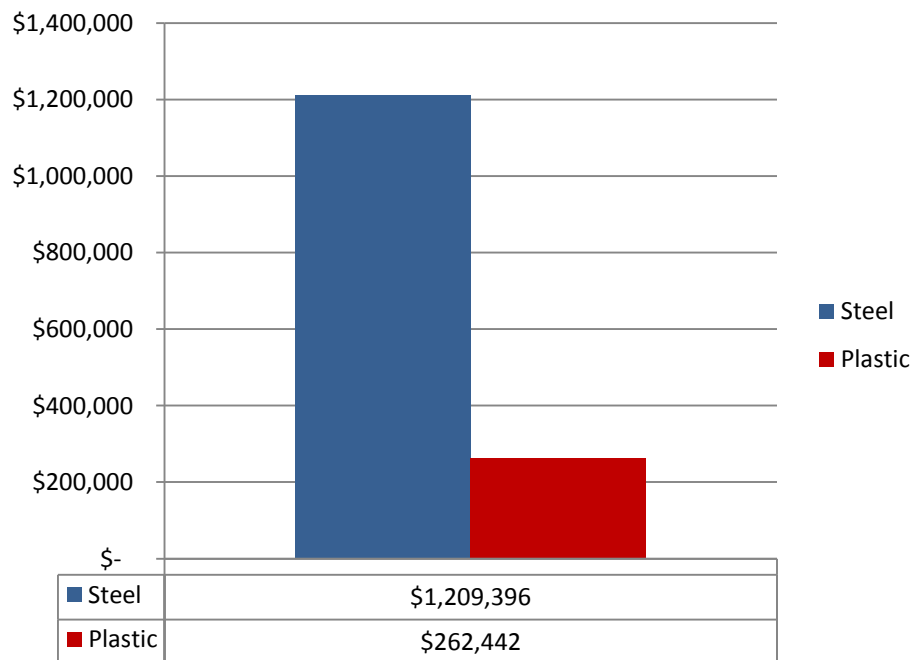
The management of WEEE Phase 1 materials does not produce many intermediary impacts that go on to feed into other downstream industries.

Downstream recycling of Phase 1 materials in 2007 were as follows:

- A small amount of metal is recovered from almost all WEEE Phase 1 materials, with the exception of printing devices.
- A small amount of glass is captured from the computer monitors and televisions.
- Plastics are captured from desktop and portable computers, computer peripherals, monitors and LCD televisions.

A portion of the commodities recovered from WEEE Phase 1 materials flow to other Ontario industries. Table 4-1 shows the percentages of recovered materials that are sold into the Ontario market. It is assumed that the WEEE Phase 1 materials flow to the end markets in the same patterns as recovered Blue Box materials.

Figure 5-9 Value of WEEE Commodity Flows to End Use Industry Sectors in Ontario (2007)

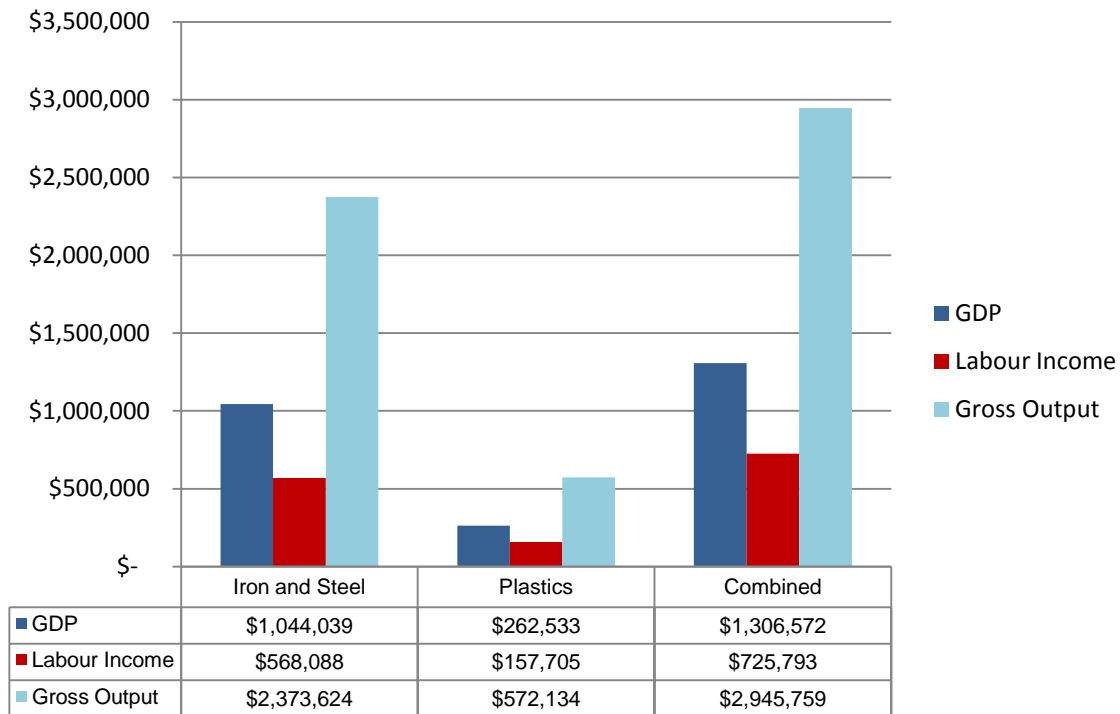


Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007, and OES, 2008

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- The dominant commodity reclaimed from WEEE Phase 1 materials being sold in Ontario is steel with sales in the order \$1,200,000.
- Plastics are the other major recovered commodity that is sold with a value of \$260,000

Figure 5-10 Economic Outputs from WEEE Downstream Sectors (2007) – GDP, Income and Gross Output

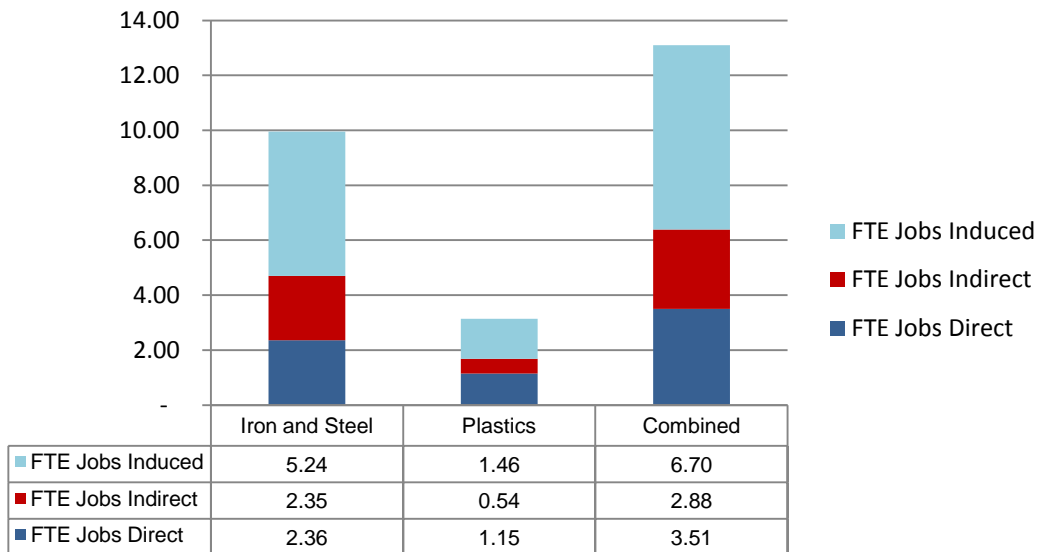


Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007, and OES, 2008

- The economic outputs related to the processing of downstream reclaimed steel from WEEE Phase 1 materials accounts for the majority of the downstream benefits.
- The combined sales of steel and plastic to Ontario industries results in the creation of \$1,300,000 of value and approximately \$700,000 of additional labour income.

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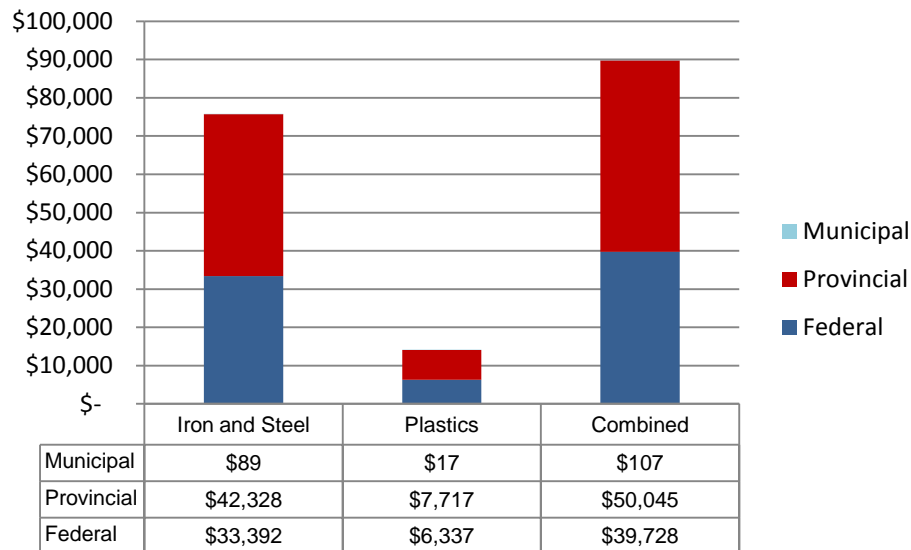
Figure 5-11 Economic Outputs from WEEE Downstream Sectors (2007) – Jobs



Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007, and OES, 2008

- The FTE job output generated by the downstream industry sectors totals 13. Most of these jobs are associated with the Iron and Steel industry.

Figure 5-12 Economic Outputs from WEEE Downstream Sectors (2007) – Taxes



Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007, and OES, 2008

- The taxes generated by the downstream industry sectors combined combine to generate just under \$90,000. Most of this tax revenue is associated with the Iron and Steel industry.

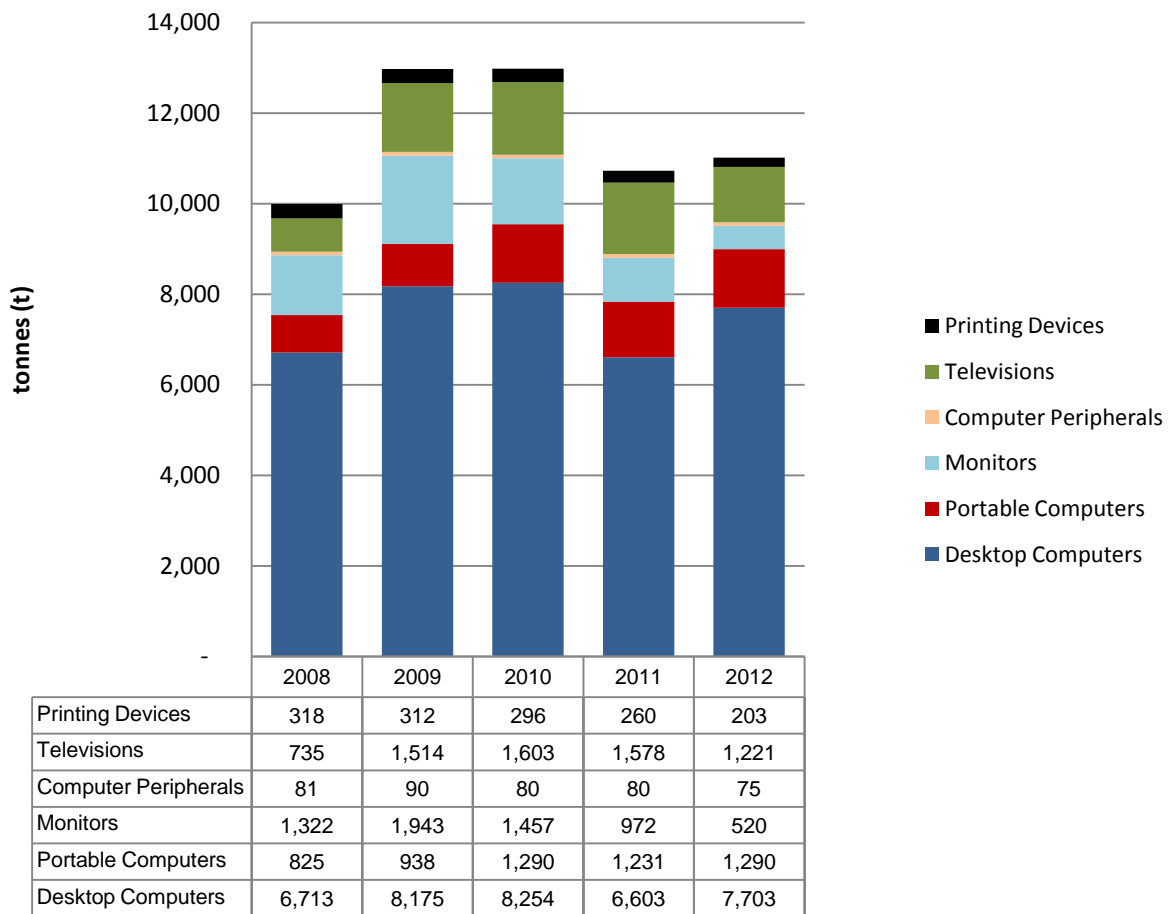
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5.4 Projections (2008 – 2012)

Based on the forecasted program performance and financial data provided in the OES WEEE Program Plan, the following forecasts of WEEE material to be processed, economic output and economic data has been prepared.

5.4.1 Forecast of Tonnes to be Reused or Refurbished

Figure 5-13 Projected Reuse or Refurbishment of WEEE Phase 1 Material



Source: AECOM, 2009 based on OES, 2008

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Figure 5-13 depicts a forecast of WEEE Phase 1 material reused and refurbished from 2008 to 2012. This forecast is based on the continued combined municipal and private sector collection, and processing and refurbishment of WEEE Phase 1 material. It is forecasted that in 2012, 9% of the Phase 1 materials available for collection will be reused or refurbished.

The tonnages of WEEE material reused and refurbished from 2008 to 2009 are provided in the OES WEEE Program Plan. Between 2010 and 2012 the tonnages of WEEE Phase 1 material reused or refurbished has been forecast using the tonnages of WEEE Phase 1 material not collected as part of the OES WEEE Program Plan and the percentage of this material that was reused or refurbished in 2009.

Table 5-3 Forecasted Percentage of Uncollected Material Reused or Refurbished in 2009

	2009
Desktop Computers	78.61%
Portable Computers	58.63%
Monitors	34.70%
Computer Peripherals	5.00%
Televisions	4.24%
Printing Devices	5.20%

Source: AECOM, 2009 based on OES, 2008

Table 5-4 Forecasted Tonnes of Uncollected Material 2010 - 2012

	2010	2011	2012
Desktop Computers	10,500	8,400	9,800
Portable Computers	2,200	2,100	2,200
Monitors	4,200	2,800	1,500
Computer Peripherals	1,600	1,600	1,500
Televisions	37,800	37,200	28,800
Printing Devices	5,700	5,000	3,900

Source: AECOM, 2009 based on OES, 2008

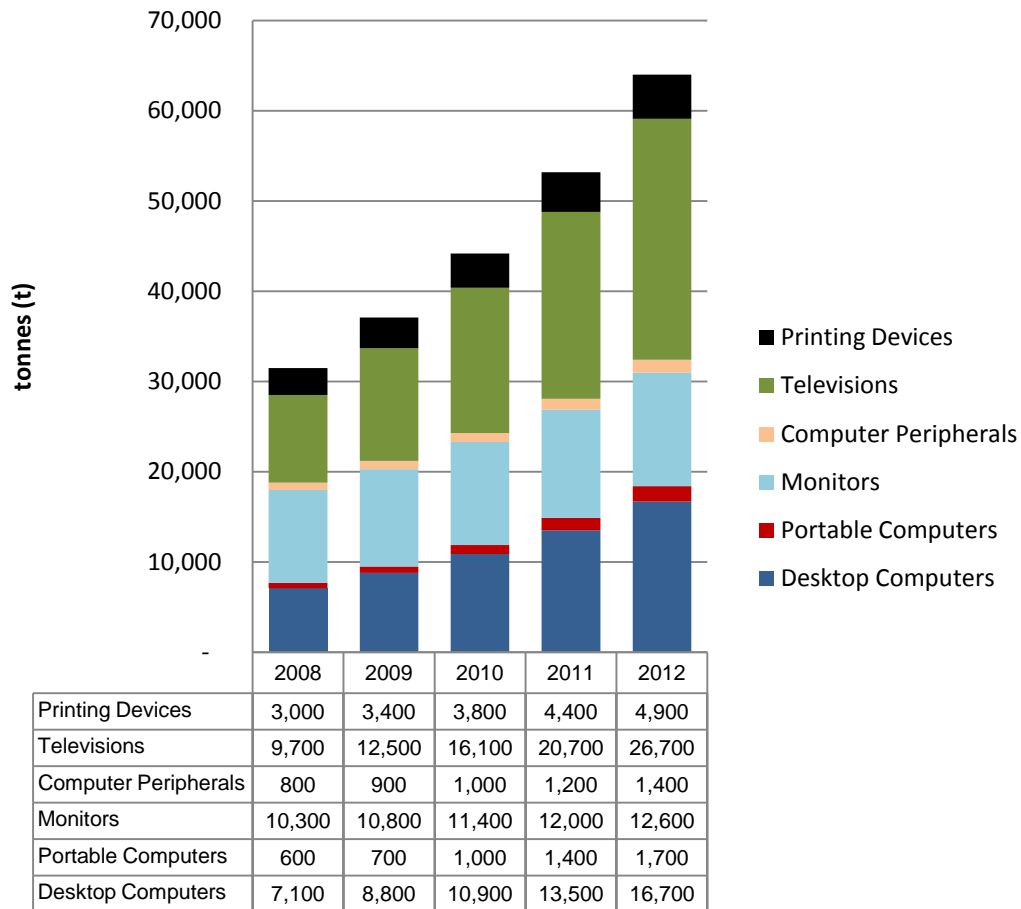
The following factors contributed to the forecast of WEEE reused or refurbished:

- In 2012, 26% of the desktop computers available for collection will be reused or refurbished.
- In 2012, 31% of the portable computers available for collection will be reused or refurbished.
- In 2012, 3% of the monitors available for collection will be reused or refurbished.
- In 2012, 2% of the computer peripherals available for collection will be reused or refurbished.
- In 2012, 2% of the televisions available for collection will be reused or refurbished.
- In 2012, 2% of the printing devices available for collection will be reused or refurbished.

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5.4.2 Forecast of Tonnes to be Diverted

Figure 5-14 Projected Diversion of WEEE Phase 1 Material



Source: AECOM, 2009 based on OES, 2008

Figure 5-14 depicts a forecast of WEEE Phase 1 material diverted from 2008 to 2012. This forecast is based on the continued participation of transporters and consolidators, and downstream and end of life (EOL) processors and processing of WEEE materials.

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It is forecasted that in 2012, 62% of the Phase 1 materials available for collection will be collected. 52% of the Phase 1 Materials available for collection are forecast to be diverted from the landfill. This is a 204% increase in the materials collected in 2007 and a 242% increase in the materials diverted.

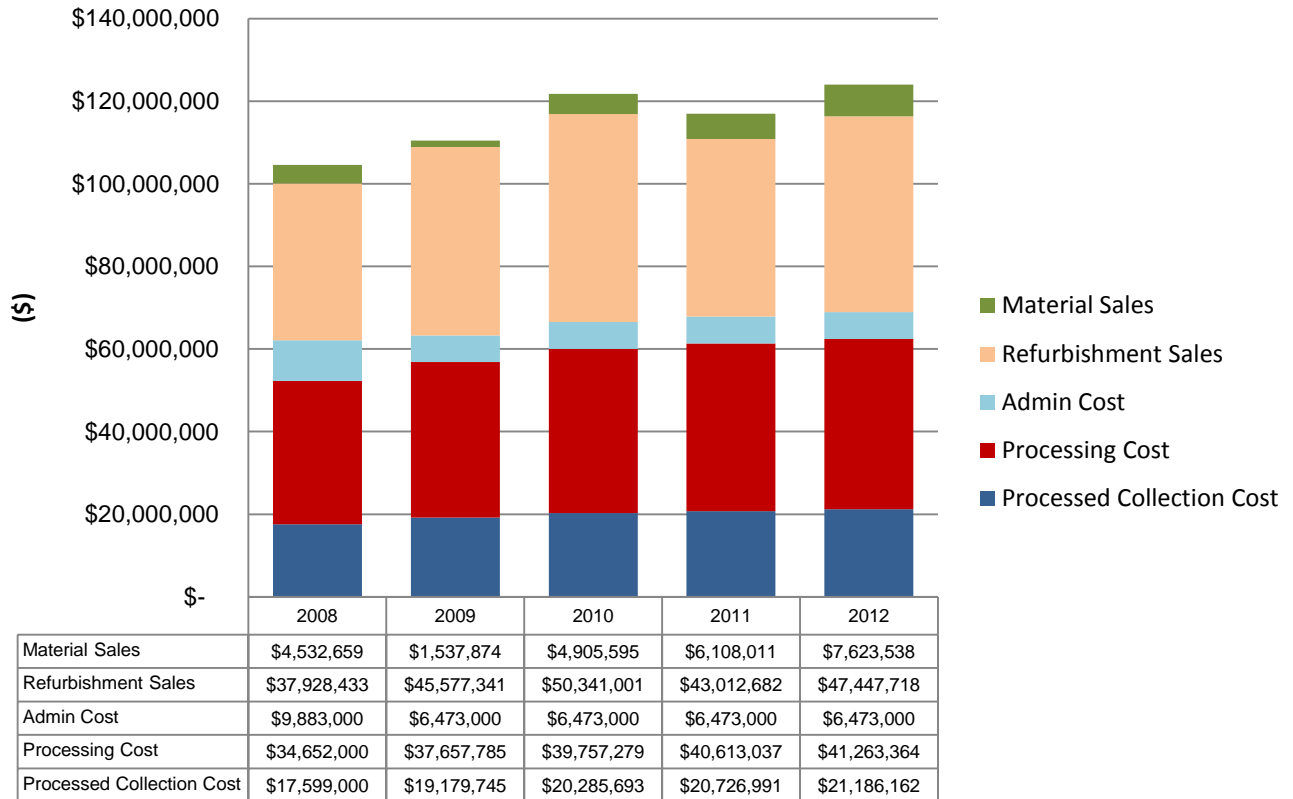
The following factors contributed to the WEEE diverted:

- Between 2007 and 2012, the percentage of desktop computers available for collection collected will increase 140%; the percentage diverted will increase 169%.
- Between 2007 and 2012, the percentage of portable computers available for collection collected will increase 186%; the percentage diverted will increase 240%.
- Between 2007 and 2012, the percentage of monitors available for collection collected will increase 64%; the percentage diverted will increase 85%.
- Between 2007 and 2012, the percentage of computers peripherals available for collection collected will increase 60%, the percentage diverted will increase 75%.
- Between 2007 and 2012, the percentage of televisions available for collection collected will increase 1021%; the percentage diverted will increase 1171%.
- Between 2007 and 2012, the percentage of printing devices available for collection collected will increase 87%; the percentage diverted will increase 113%.

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5.4.3 Forecast of System Costs and Revenues

Figure 5-15 Forecast Direct Economic Output Associated with Handling of Phase 1 WEEE Materials between 2008 - 2012



Source: AECOM, 2009 based on OES, 2008

Figure 5-15 shows the forecasted direct economic output associated with handling WEEE Phase 1 materials from 2008 to 2012. The direct economic output in 2012 is valued at over \$124,000,000. This is more than 40% more economic output than in 2007. The primary economic activities responsible for this output are the refurbishment and reuse sales, material sales, collection and processing of WEEE Phase 1 material, as well as the administration of the OES WEEE program plan.

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The direct gross output forecast to be associated with WEEE management:

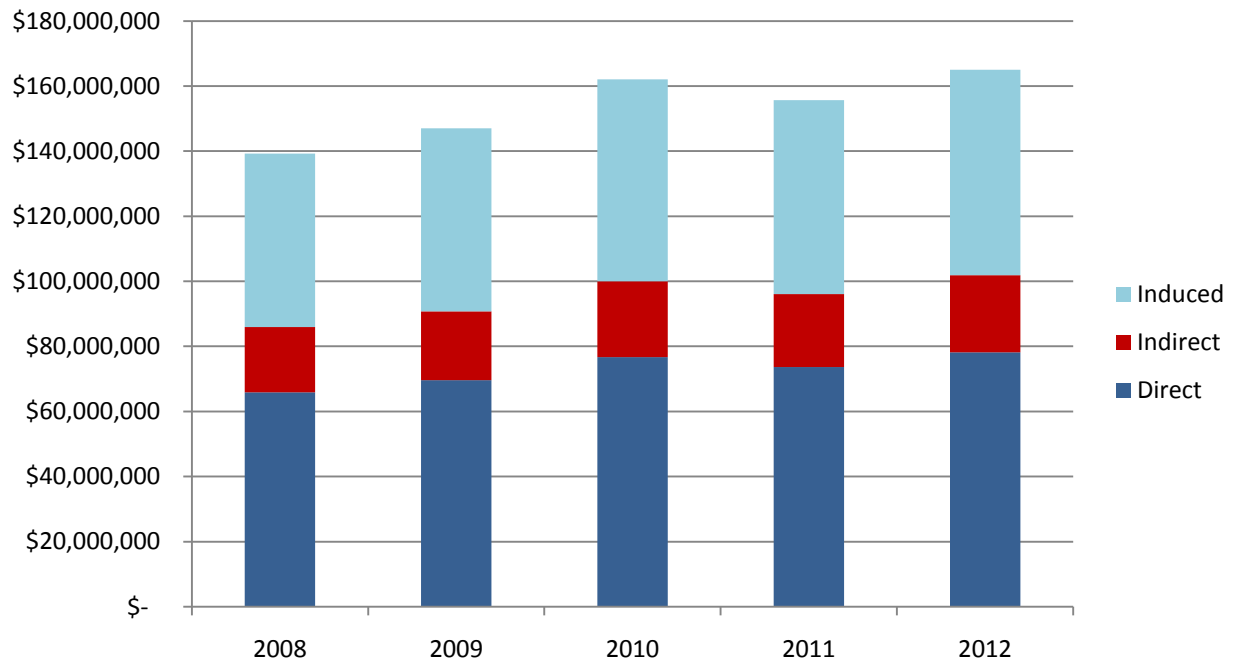
- In 2012, approximately \$21,200,000 will be spent on the collection of WEEE. Collection will account for a smaller percentage of the total economic output associated with WEEE at 17%.
- Approximately \$41,300,000 will be spent on the processing of WEEE in 2012. Processing will account for a slightly smaller percentage of the total economic output associated with WEEE at 33%.
- In 2012, roughly \$6,500,000 will be spent on the administration of the Stewardship Ontario WEEE program. This economic output did not exist in 2007. Administration of the phase 1 plan will account for 5% of the economic output.
- Approximately \$47,400,000 economic output will be generated from the reuse and refurbishment of WEEE materials. Processing will account for a slightly smaller percentage of the total economic output associated with WEEE at 38%.
- Approximately \$7,600,000 economic output will be generated from the reclaimed material sales of WEEE materials. Processing will account for a slightly smaller percentage of the total economic output associated with WEEE at 6%.

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5.4.4 Forecast of Economic Impacts

5.4.4.1 Waste Management and Remediation Sector and Upstream Economic Impacts

Figure 5-16 Forecasted Gross Domestic Product Attributable to WEEE Management 2008 – 2012



	2008	2009	2010	2011	2012
Direct	\$65,913,630	\$69,587,986	\$76,732,213	\$73,689,176	\$78,138,277
Indirect	\$20,029,542	\$21,146,089	\$23,317,045	\$22,392,340	\$23,744,313
Induced	\$53,277,110	\$56,247,043	\$62,021,627	\$59,561,980	\$63,158,129
Total Impact	\$139,220,283	\$146,981,118	\$162,070,885	\$155,643,496	\$165,040,719

Source: AECOM, 2009 based on OES, 2008

Figure 5-16 illustrates how the management of WEEE materials is forecast to create value to the 2008 - 2012 Ontario economy directly, indirectly and through inducing consumer spending.

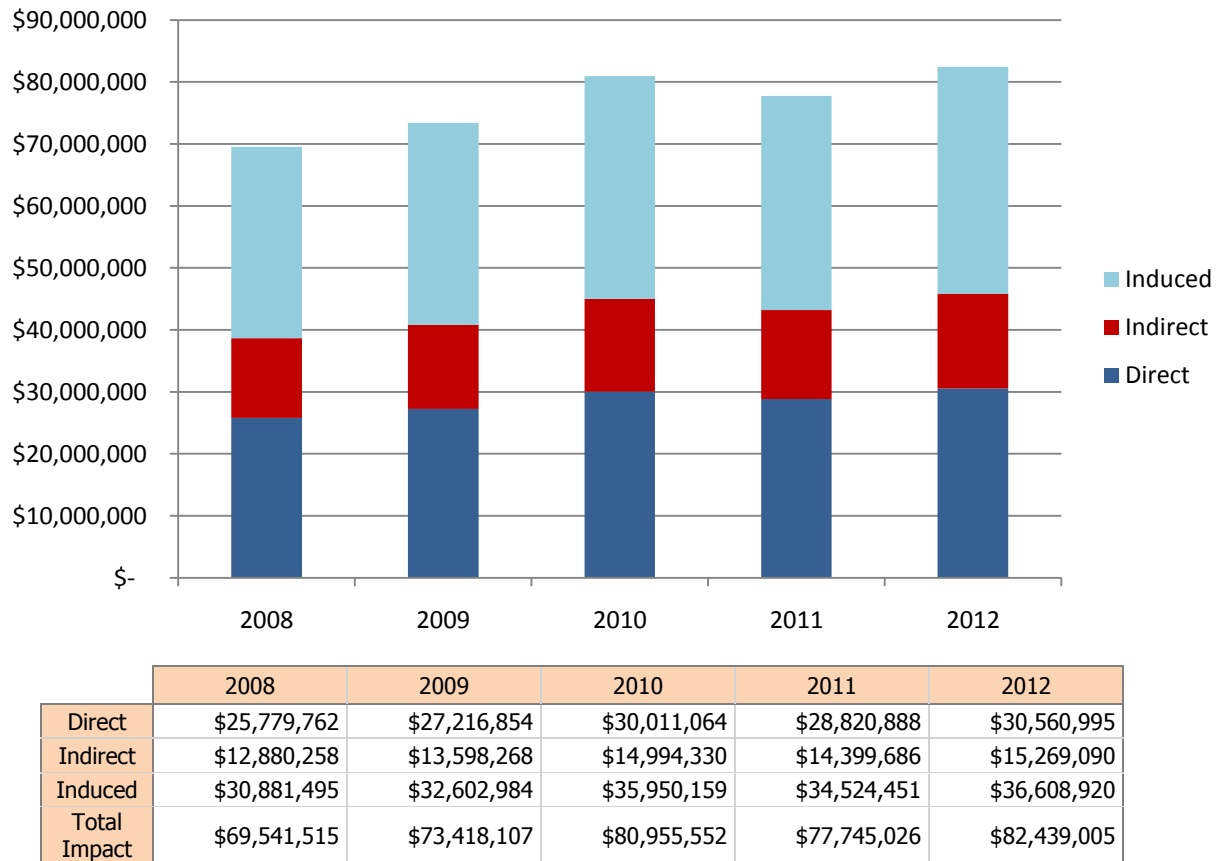
Factors influencing the creation of value in the Ontario economy include:

- For every dollar of direct output from the management of WEEE phase 1 material, \$1.33 of value is created.
- For every dollar of direct output from the management of WEEE phase 1 material, \$0.63 of value is created directly.

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- For every dollar of direct output from the management of WEEE phase 1 material, \$0.19 of value is created indirectly.
- For every dollar of direct output from the management of WEEE phase 1 materials, \$0.51 value is created through induced spending.

Figure 5-17 Forecast Labour Income Attributable to WEEE Management 2008 – 2012



Source: AECOM, 2009 based on OES, 2008

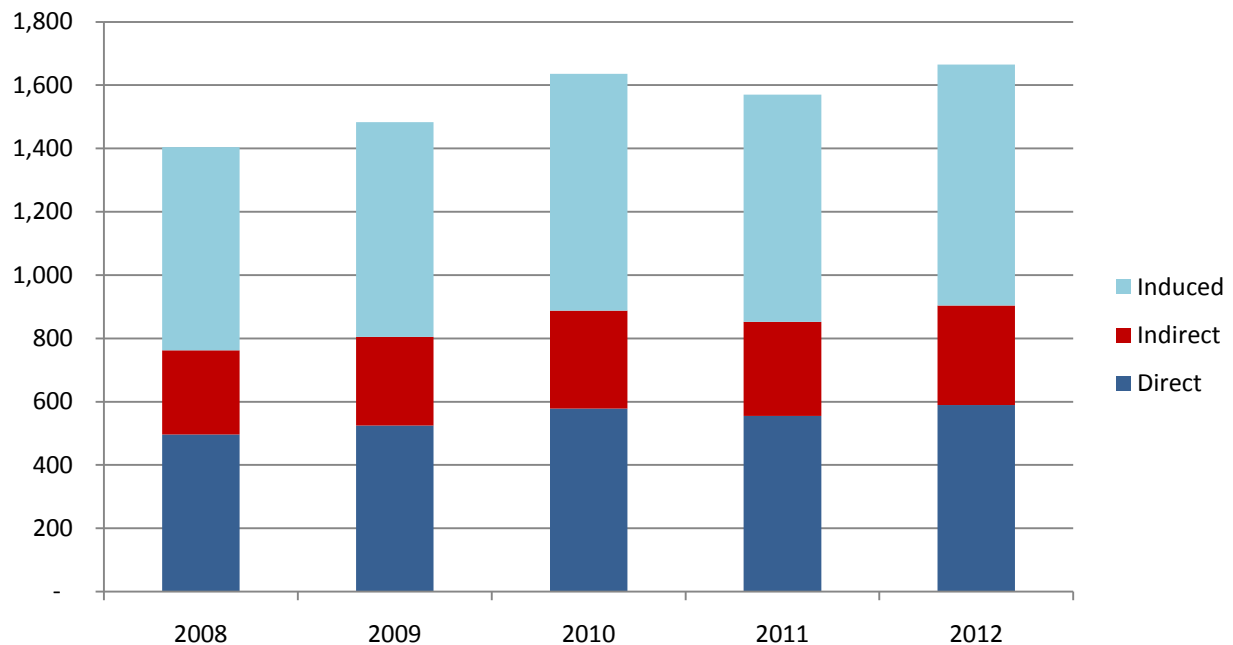
Figure 5-17 depicts the forecast of labour income created in Ontario in between 2008 and 2012 through the management of WEEE Phase 1 materials through direct jobs, indirect jobs and jobs created to support the increase in consumer spending.

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The labour income forecast to be associated with the management of WEEE materials in 2012 is influenced by:

- A total of \$1,288 of labour income is forecasted to be created for each tonne of WEEE phase 1 material diverted from the landfill in 2012.
- \$478 of the labour income created per tonne diverted is forecasted to be directly associated with the management of WEEE Phase 1 material.
- \$239 of the labour income created per tonne diverted is forecasted to be indirectly associated with the management of WEEE Phase 1 material.
- \$572 of the labour income created per tonne diverted is forecasted, related to induced consumer spending associated with the management of WEEE Phase 1 material.

Figure 5-18 Forecast full Time Equivalent employment Attributable to WEEE Management 2008 – 2012



	2008	2009	2010	2011	2012
Direct	497	525	578	555	589
Indirect	266	281	310	297	315
Induced	642	678	747	718	761
Total Impact	1,405	1,483	1,635	1,570	1,665

Source: AECOM, 2009 based on OES, 2008

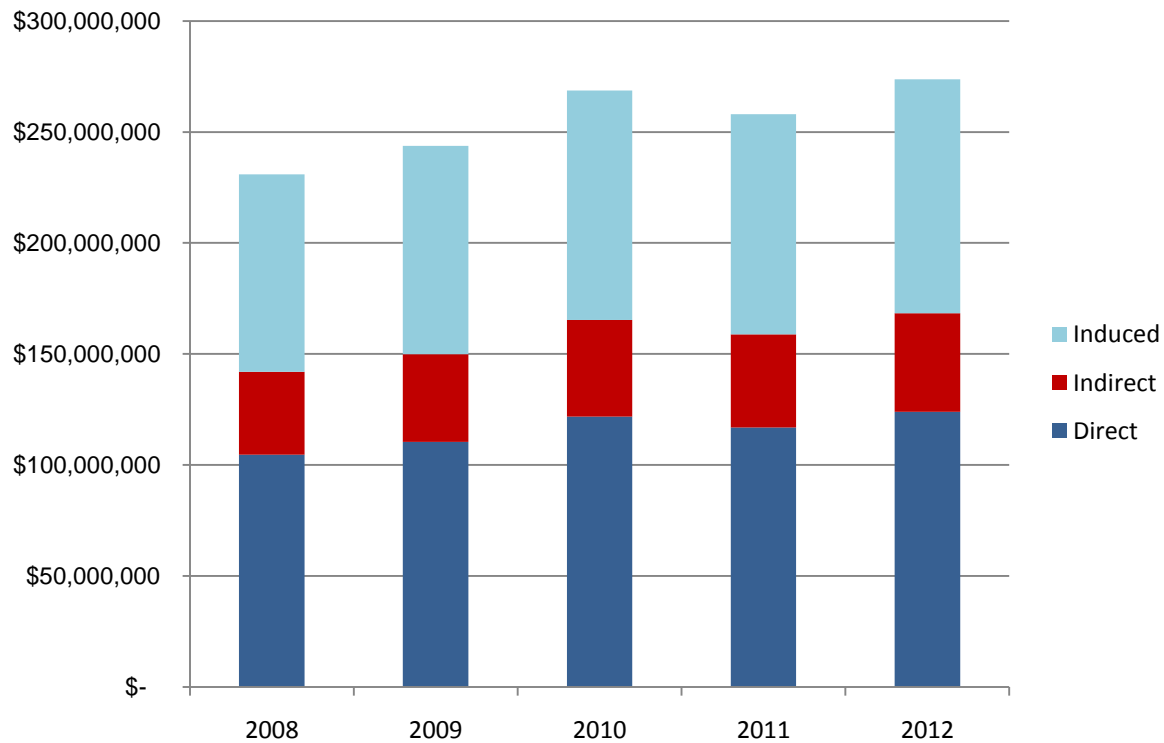
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Figure 5-18 depicts the forecasted Ontario full time equivalent employment directly and indirectly created through the management of WEEE as well through additional related induced spending between 2008 and 2012. WEEE Phase 1 material handling is forecast to remain a relatively small industry directly employing only 589 people in 2012.

The employment associated with the management of WEEE Phase 1 Materials in 2007 is influenced by:

- One direct job is forecasted to be created for every 109 tonnes of WEEE Phase 1 Material diverted in 2012.
- One indirect job is forecasted to be created for every 203 tonnes of WEEE Phase 1 Material diverted in 2012.
- One job is forecasted to be induced by consumer spending for every 84 tonnes of WEEE Phase 1 Material diverted in 2012.

Figure 5-19 Forecast Gross Output Attributable to WEEE Management 2008 – 2012



	2008	2009	2010	2011	2012
Direct	\$104,595,092	\$110,425,746	\$121,762,568	\$116,933,722	\$123,993,780
Indirect	\$37,457,804	\$39,545,889	\$43,605,854	\$41,876,538	\$44,404,901
Induced	\$88,794,862	\$93,744,732	\$103,369,003	\$99,269,607	\$105,263,167
Total Impact	\$230,847,757	\$243,716,367	\$268,737,425	\$258,079,867	\$273,661,848

Source: AECOM, 2009 based on OES, 2008

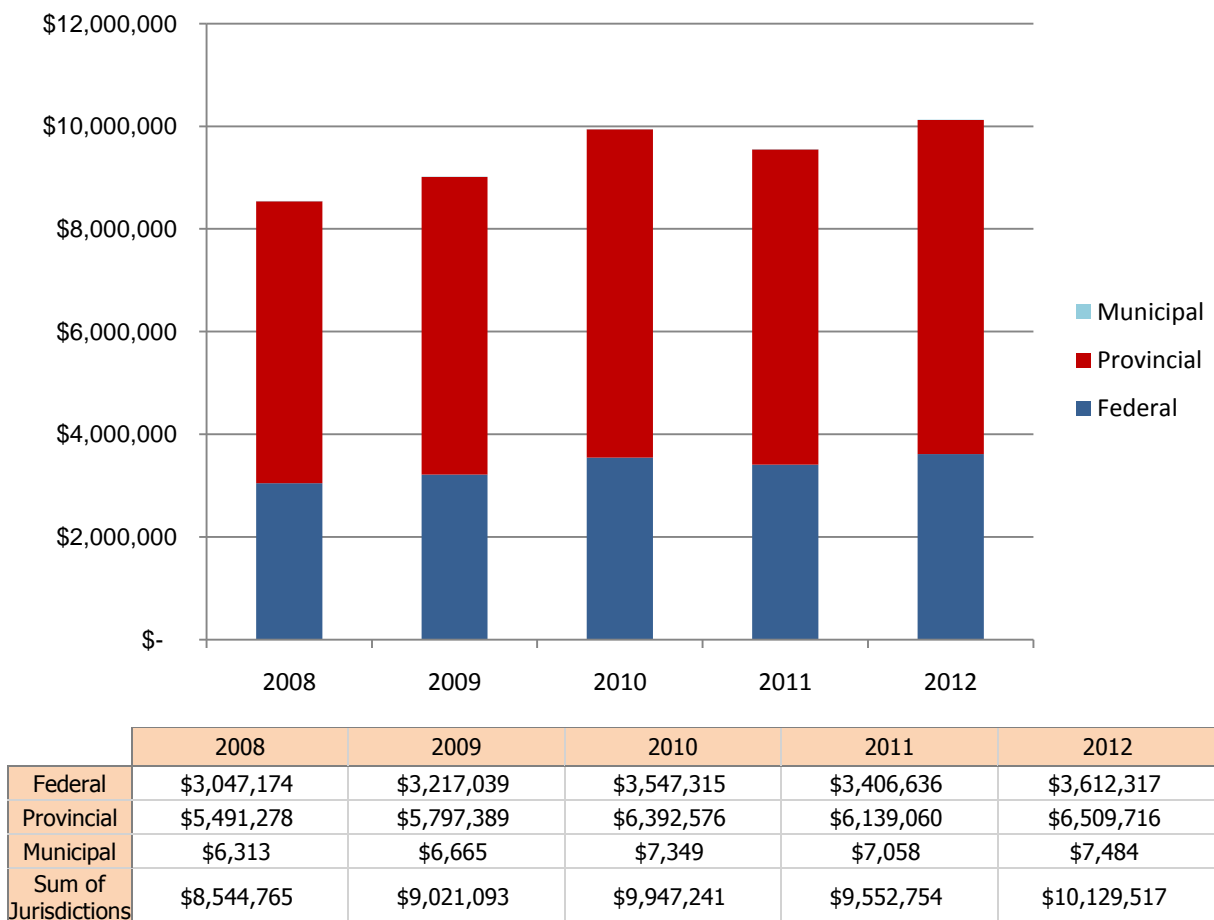
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Figure 5-19 shows the forecasted value of Ontario's production of goods and services associated with the handling of WEEE Phase 1 materials between 2008 and 2012.

Ontario's forecast Gross output related to WEEE management is influenced by:

- In 2012, \$4,276 of total economic output is forecasted to be created for each tonne of WEEE phase 1 material diverted from the landfill.
- In 2012, \$1,937 of direct economic output is forecasted to be created for each tonne of WEEE phase 1 material diverted from the landfill.
- In 2012, \$694 of indirect economic output is forecasted to be created for each tonne of WEEE phase 1 material diverted from the landfill.
- In 2012, \$1,645 of induced economic output is forecasted to be created for each tonne of WEEE phase 1 material diverted from the landfill.

Figure 5-20 Forecasted Taxes Attributable to WEEE Management 2008 – 2012



Source: AECOM, 2009 based on OES, 2008

Section 5: WEEE

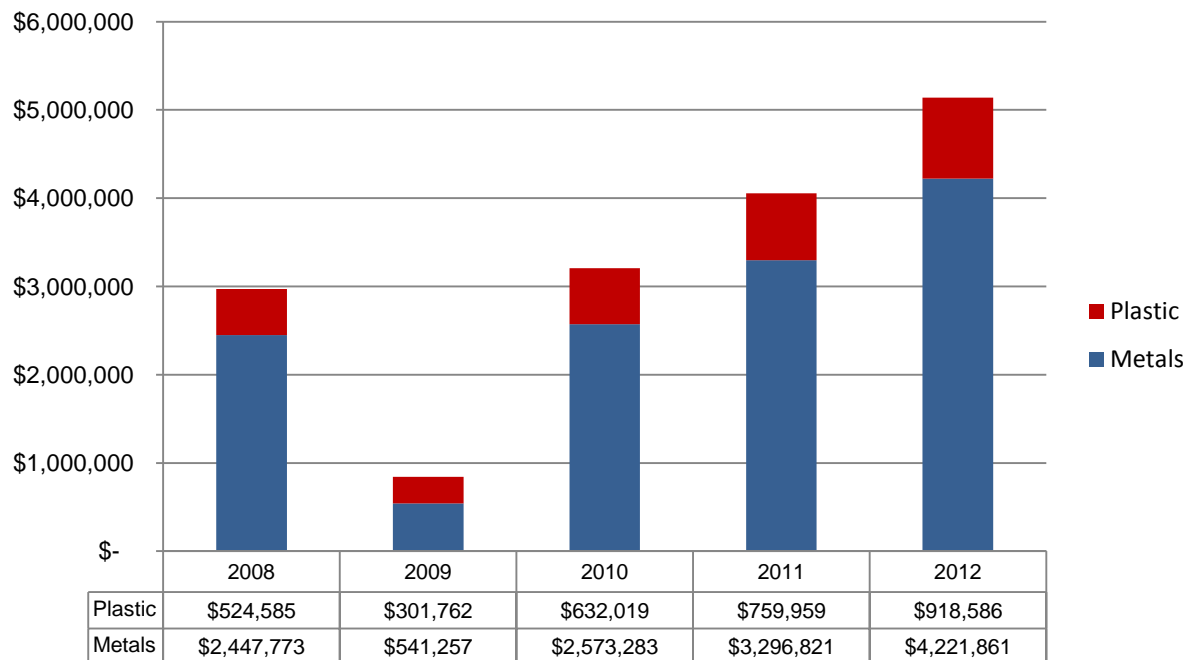
Figure 5-20 depicts the forecasted taxes to be generated by the management of WEEE Phase 1 materials between 2008 and 2012 at the federal, provincial and municipal level. These taxes do not include corporate taxes, income taxes, or property taxes paid by industry and workers.

Tax associated WEEE Phase 1 material management is influenced by:

- In 2012, Federal taxes are forecasted to total \$3,612,000 comprising of the Federal gas tax, Federal duty and excise taxes, Federal air tax, G.S.T.
- In 2012, Provincial taxes are forecasted to total \$6,510,000 comprising of Provincial gas tax, and Provincial sales tax.
- In 2012, Municipal taxes are forecasted to receive marginal contribution through small payments of municipal amusement and municipal sales taxes

5.4.4.2 Downstream Economic Impacts

Figure 5-21 Forecasted value of Recovered WEEE Material Flows to End Use Industry Sectors in Ontario from 2008 – 2012

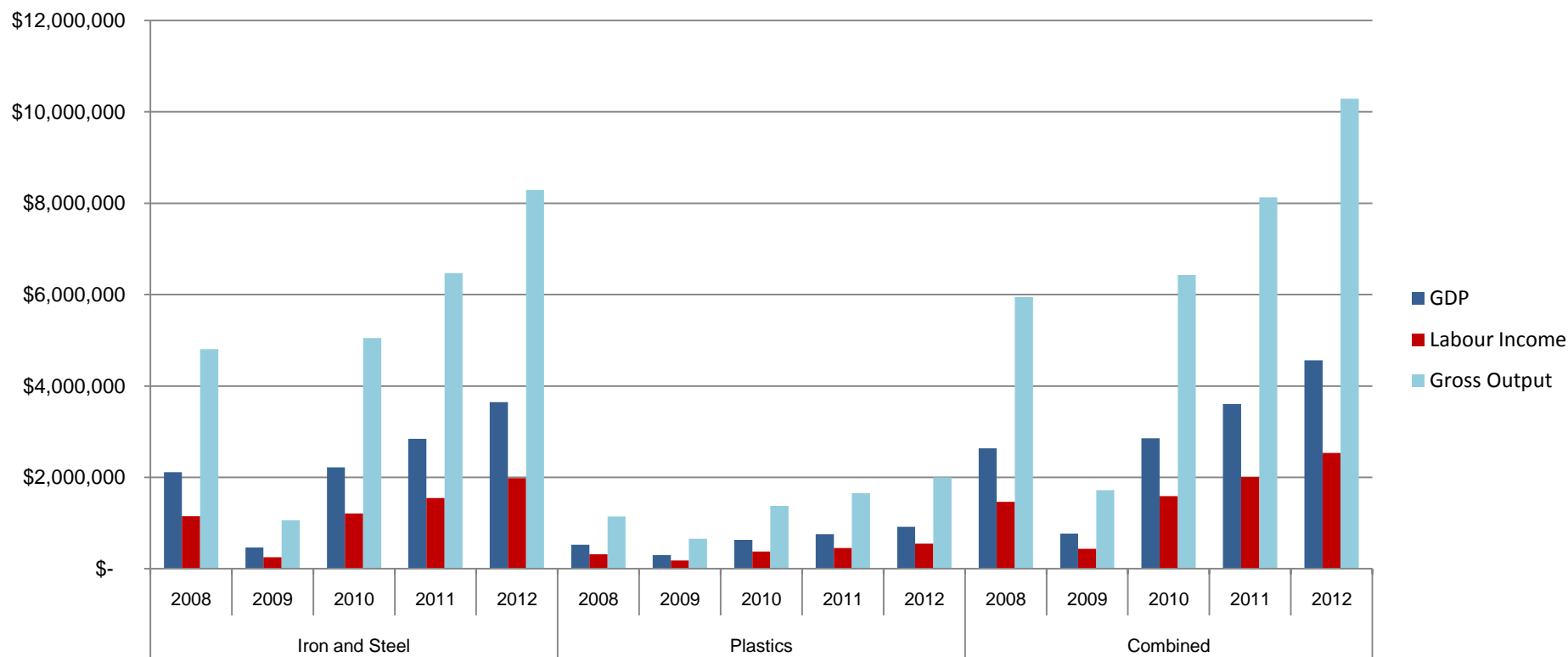


Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007 and OES 2008

The projected value of commodities sold to end use industries in Ontario is projected in Figure 5-21 to total over \$5 million in 2012. Metals account for over 80% of this value. Plastic almost doubles its value between 2008 and 2012.

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Figure 5-22 Economic Outputs from WEEE Downstream Sectors 2008 – 2012 – GDP, Labour Income, Gross Output



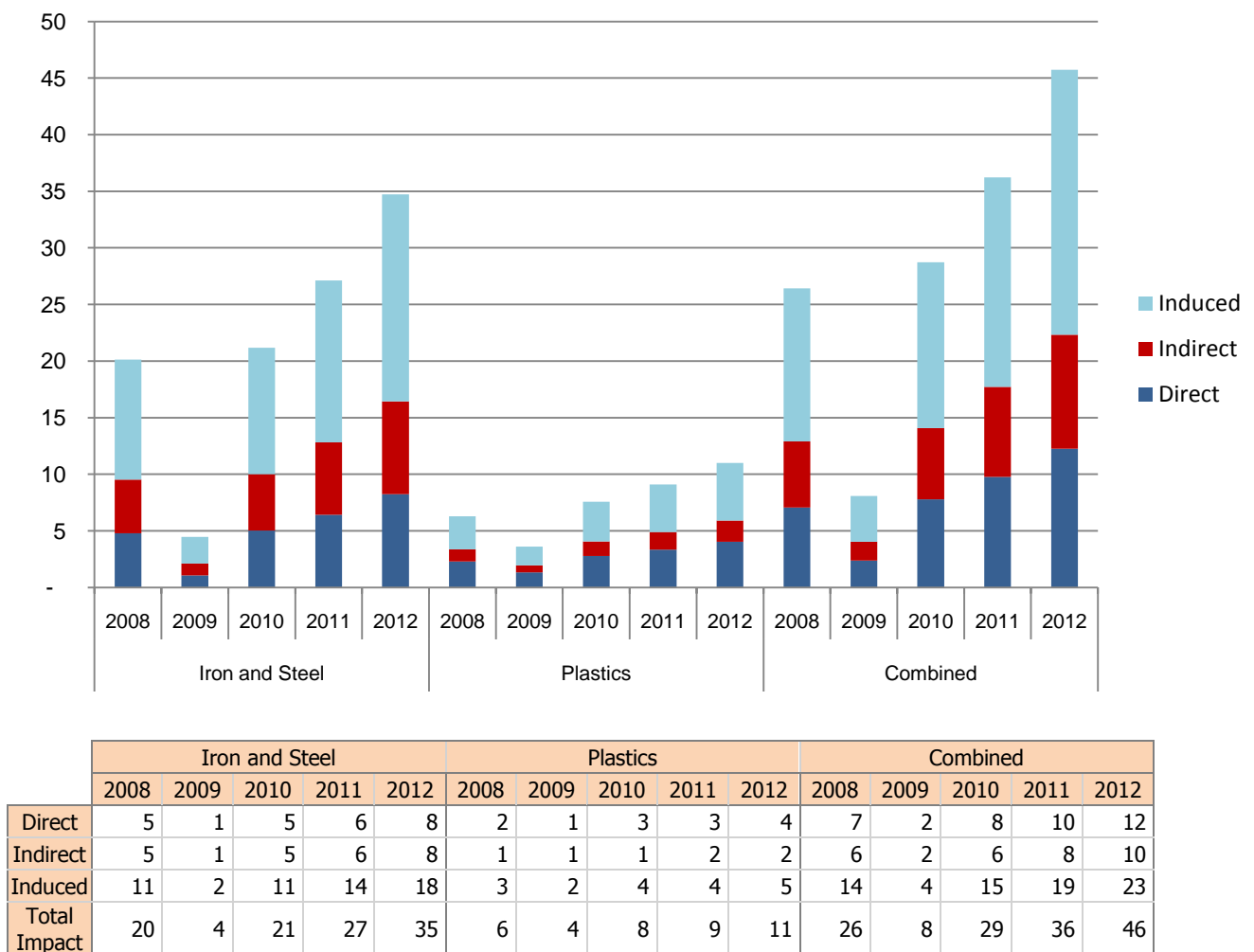
	Iron and Steel					Plastics					Combined				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
GDP	2,113,098	467,253	2,221,447	2,846,058	3,644,620	524,765	301,866	632,236	760,220	918,902	2,637,863	769,118	2,853,683	3,606,278	4,563,522
Labour Income	1,149,790	254,244	1,208,745	1,548,612	1,983,130	315,230	181,333	379,789	456,670	551,991	1,465,020	435,577	1,588,534	2,005,281	2,535,120
Gross Output	4,804,131	1,062,300	5,050,463	6,470,518	8,286,050	1,143,615	657,853	1,377,825	1,656,740	2,002,552	5,947,746	1,720,152	6,428,288	8,127,258	10,288,603

Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007 and OES 2008

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- The forecasted pattern of economic outputs generated by the downstream industry sectors that purchase reclaimed WEEE Phase 1 materials is calculated using the same methodology described in section 4.3.2.
- In 2012, the steel industry is predicted to generate the largest economic impacts associated with the use of recycled WEEE Phase 1 materials, followed by the plastics industry. These two sectors combined generate \$4.6 million of GDP, \$2.5 million in labour income, and \$10.3 million in gross output.

Figure 5-23 Economic Outputs from WEEE Downstream Sectors 2008 – 2012 – FTE Jobs

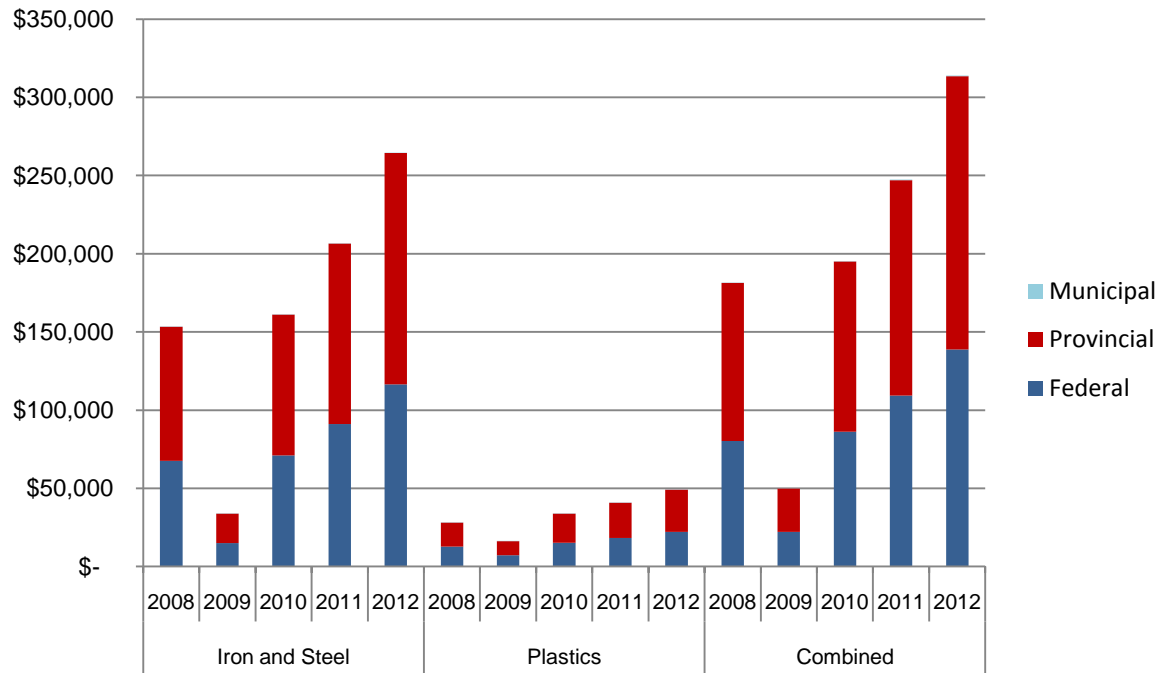


Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007 and OES 2008

- WEEE Phase 1 Material derived Ontario job outputs produced by the downstream industry sectors are projected to total not more than 45 jobs in 2012.

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Figure 5-24 Economic Outputs from WEEE Downstream Sectors 2008 – 2012 – Taxes



	Iron and Steel					Plastics					Combined				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Federal	\$67,584	\$14,944	\$71,049	\$91,026	\$116,567	\$12,666	\$7,286	\$15,260	\$18,349	\$22,179	\$80,250	\$22,230	\$86,309	\$109,375	\$138,746
Provincial	\$85,671	\$18,944	\$90,064	\$115,388	\$147,764	\$15,425	\$8,873	\$18,584	\$22,346	\$27,010	\$101,096	\$27,817	\$108,648	\$137,733	\$174,774
Municipal	\$180	\$40	\$190	\$243	\$311	\$35	\$20	\$42	\$51	\$61	\$215	\$60	\$232	\$293	\$372
Sum of Jurisdictions	\$153,435	\$33,928	\$161,303	\$206,656	\$264,641	\$28,126	\$16,179	\$33,886	\$40,745	\$49,250	\$181,561	\$50,107	\$195,188	\$247,402	\$313,891

Source: AECOM, 2009 based on Stewardship Ontario, 2006, WDO, 2007 and OES 2008

- The taxes that will be generated come to just under \$314,000 in 2012. The federal contribution is \$139 thousand, and the provincial contribution is \$175,000. The municipal contribution is marginal.

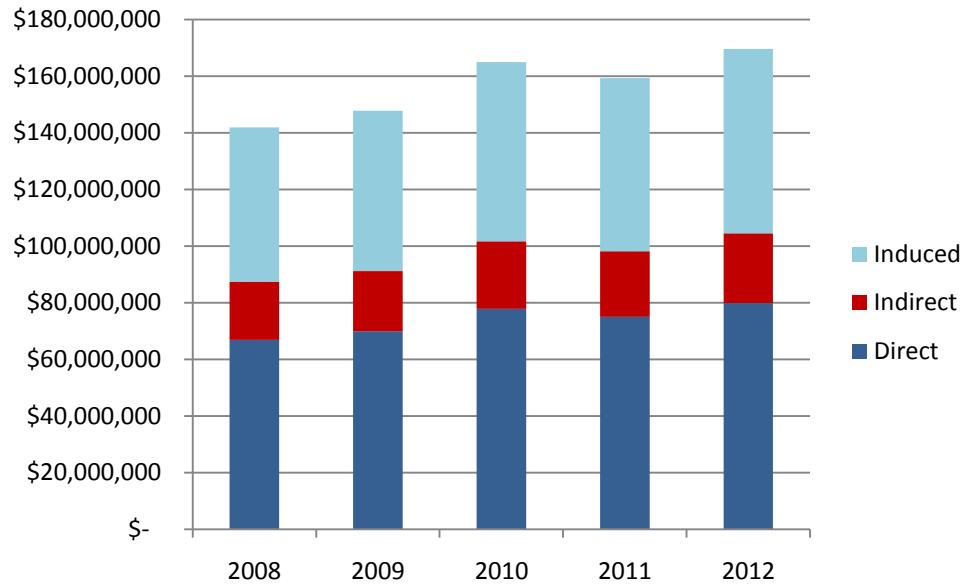
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5.4.5 2008 - 2012 Combined Upstream and Downstream Economic Impacts

- In 2012, the direct economic output of the upstream and downstream sectors associated with the Phase 1 WEEE program is projected to be \$129 million.
- The Gross Domestic Product (GDP) impact is anticipated to be \$170 million and of this sum, 47% will be attributable to direct effects, 15% to indirect effects and 38% to induced income spending by direct and indirect labour (Figure 5-25).
- Labour Income generated from the direct Gross Output is expected to be \$85 million and of this sum, 36% will be accounted for by direct employment, 19% by indirect employment and 45% by induced employment (Figure 5-26).
- The 2012 upstream and downstream impacts of Phase 1 WEEE program are expected to create in 1,711 FTE jobs in the Ontario economy (Figure 5-27).
- Of this total number of jobs, 601 FTE jobs will be directly created and 325 indirectly created.
- Approximately 784 additional induced FTE jobs will also be created in the economy through the income spending of direct and indirect employees in the upstream and downstream sectors.
- Total Gross Output is expected to amount to \$284 million and of this sum, the direct portion will account for 45%, indirect for 16% and induced for 39% (Figure 5-28).
- In 2012, each tonne of WEEE diverted will create approximately: \$2,650 of total GDP, \$1,328 of total labour income and \$4,437 of Gross Output.
- In 2012, approximately .027 jobs will be created for each tonne of WEEE material diverted.
- Tax revenues spawned by the 2007 Phase 1 of the WEEE Program in upstream and downstream sectors are projected to total \$10.4 million (Figure 5-29).
- Federal coffers will receive, \$3.7 million, provincial coffers \$6.6 million and municipal coffers a marginal amount.

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Figure 5-25 Economic Outputs from WEEE Combined Upstream and Downstream Sectors – GDP (2008 - 2012)

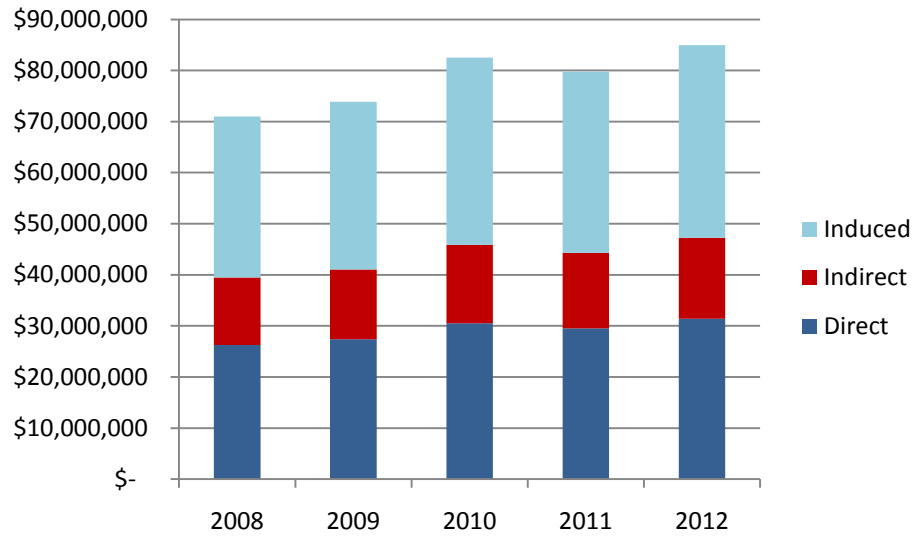


		2008	2009	2010	2011	2012
GDP	Direct	\$66,895,681	\$69,871,382	\$77,793,337	\$75,030,913	\$79,837,013
	Indirect	\$20,562,974	\$21,298,107	\$23,892,597	\$23,120,596	\$24,666,894
	Induced	\$54,399,491	\$56,580,747	\$63,238,634	\$61,098,265	\$65,100,334
	Total Impact	\$141,858,145	\$147,750,236	\$164,924,568	\$159,249,774	\$169,604,241

Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 5-26 Economic Outputs from WEEE Combined Upstream and Downstream Sectors – Labour Income (2008 - 2012)

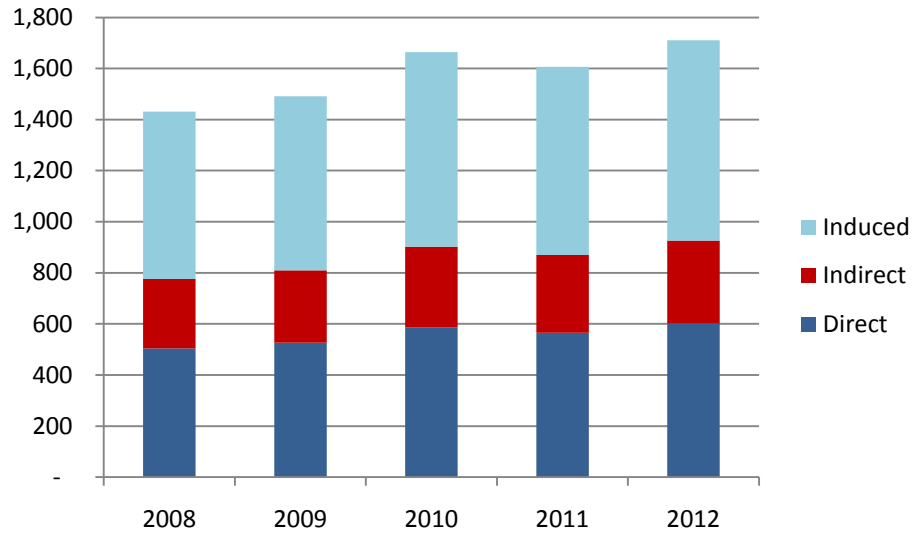


		2008	2009	2010	2011	2012
Labour Income	Direct	\$26,274,412	\$27,367,179	\$30,548,829	\$29,498,889	\$31,417,196
	Indirect	\$13,200,052	\$13,690,092	\$15,339,674	\$14,836,476	\$15,822,231
	Induced	\$31,532,070	\$32,796,412	\$36,655,583	\$35,414,942	\$37,734,698
	Total Impact	\$71,006,534	\$73,853,684	\$82,544,085	\$79,750,307	\$84,974,125

Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 5-27 Economic Outputs from WEEE Combined Upstream and Downstream Sectors – FTE Jobs (2008 - 2012)

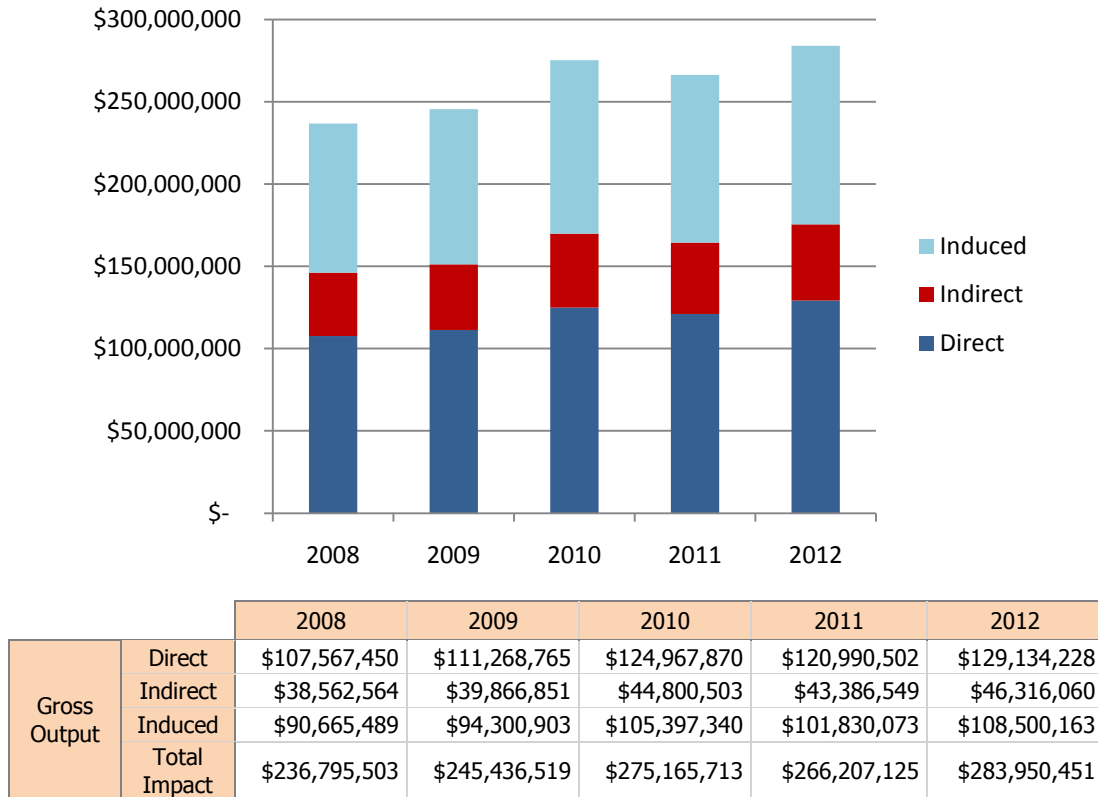


		2008	2009	2010	2011	2012
FTE Jobs	Direct	504	527	586	565	601
	Indirect	272	282	316	305	325
	Induced	656	682	762	736	784
	Total Impact	1,431	1,491	1,664	1,607	1,711

Source: AECOM 2009, Based on Statistics Canada, 2009

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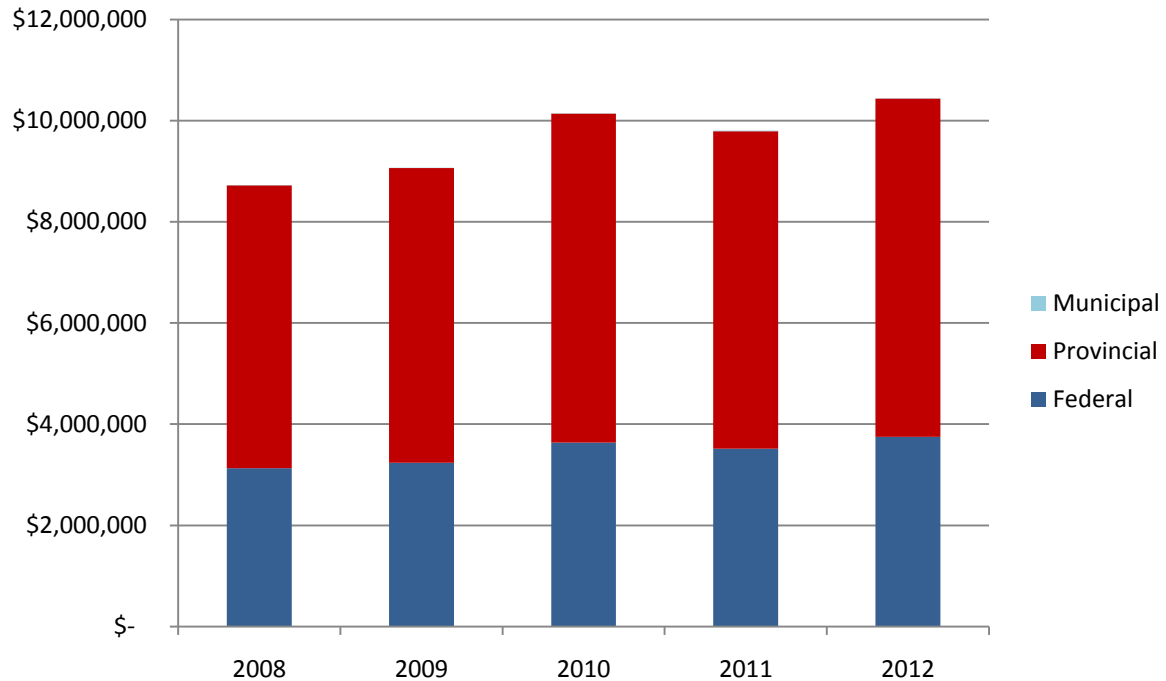
Figure 5-28 Economic Outputs from WEEE Combined Upstream and Downstream Sectors – Gross Output (2008 - 2012)



Source: AECOM 2009, Based on Statistics Canada, 2009

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Figure 5-29 Economic Outputs from WEEE Combined Upstream and Downstream Sectors – Taxes (2008 - 2012)



	2008	2009	2010	2011	2012
Federal	\$3,127,424	\$3,239,269	\$3,633,624	\$3,516,011	\$3,751,063
Provincial	\$5,592,374	\$5,825,206	\$6,501,224	\$6,276,793	\$6,684,489
Municipal	\$6,528	\$6,725	\$7,581	\$7,351	\$7,856
Sum of Jurisdictions	\$8,726,326	\$9,071,200	\$10,142,429	\$9,800,156	\$10,443,409

Source: AECOM 2009, Based on Statistics Canada, 2009

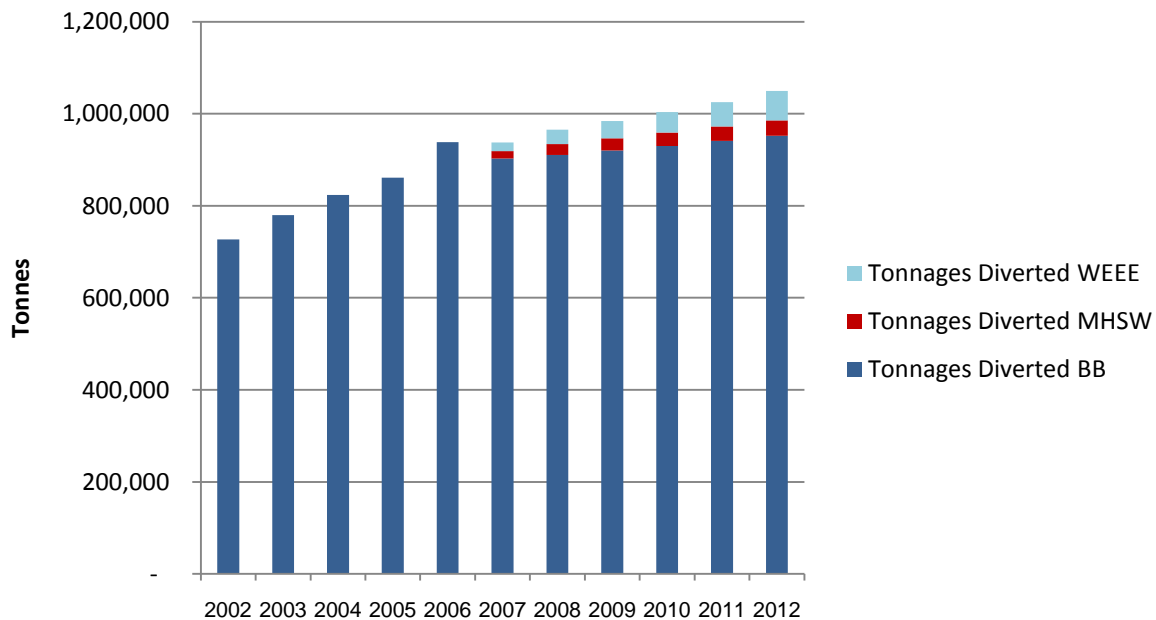
Section 6: Conclusions

6. Conclusions

6.1 Current Programs

6.1.1 2002-2012 Program Flows

Figure 6-1 Program Diversion Flows Actual and Projected

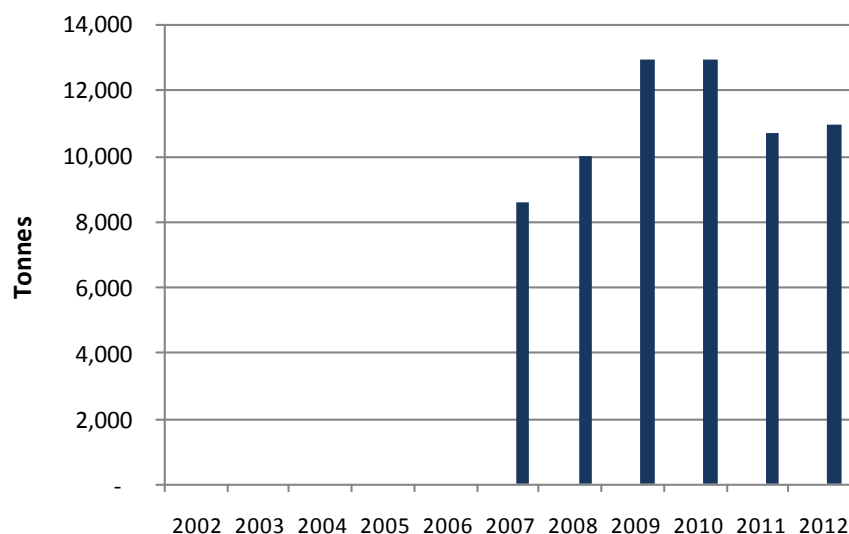


Source: AECOM, 2009

- Figure 6-1 depicts the actual and projected diversion tonnages for the three recycling programs. From 2002 to 2007, the flow of materials was predominately via the Blue Box and tonnage growth over the period was in the order of 25%, increasing from approximately 727,000 tonnes to 937,000 tonnes.
- From 2008 through to 2012, it is predicted that the flow of recyclable material will grow by 9%. Most of the growth in this period however will be attributable to increasing material capture in the WEEE and MHSW programs. The Blue Box program is now a mature program and its increase in tonnage will be largely co-related to provincial population growth.
- The WEEE program is the only program of the three under study that produces material that can be reused and refurbished. The tonnages predicted for the program show growth from 2007 through to 2009 (8,600 to 13,000 tonnes) and then a levelling off and retraction through to 2012 (Figure 6-2).
- By 2012, the volume of material captured for reuse and regeneration is expected to be in the order of 11,000 tonnes.

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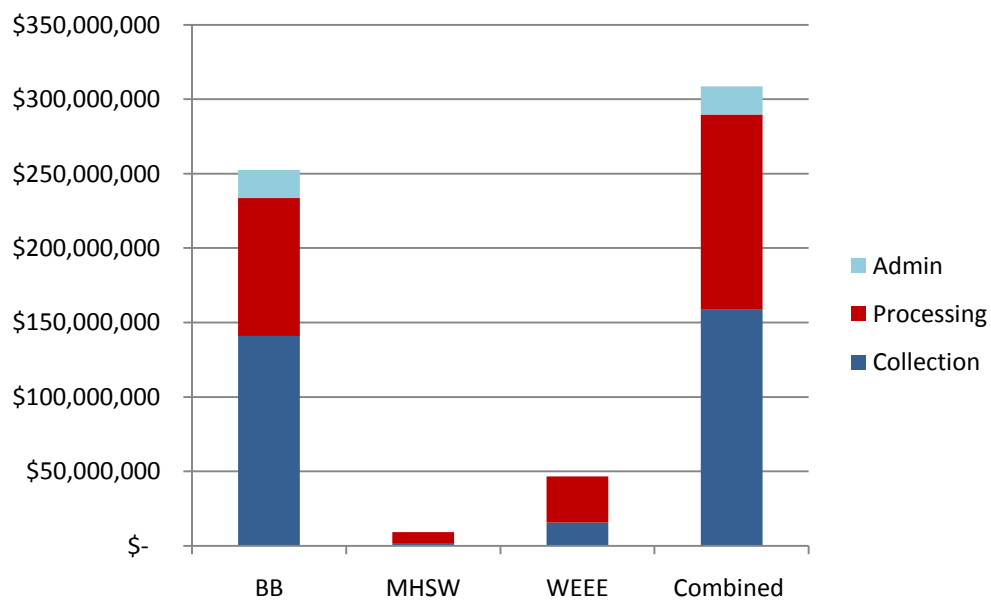
Figure 6-2 Reuse and Refurbishment Flows (WEEE Program)



Source: AECOM, 2009

6.1.2 2007 Program Costs and Revenues

Figure 6-3 2007 Program Costs (Gross)

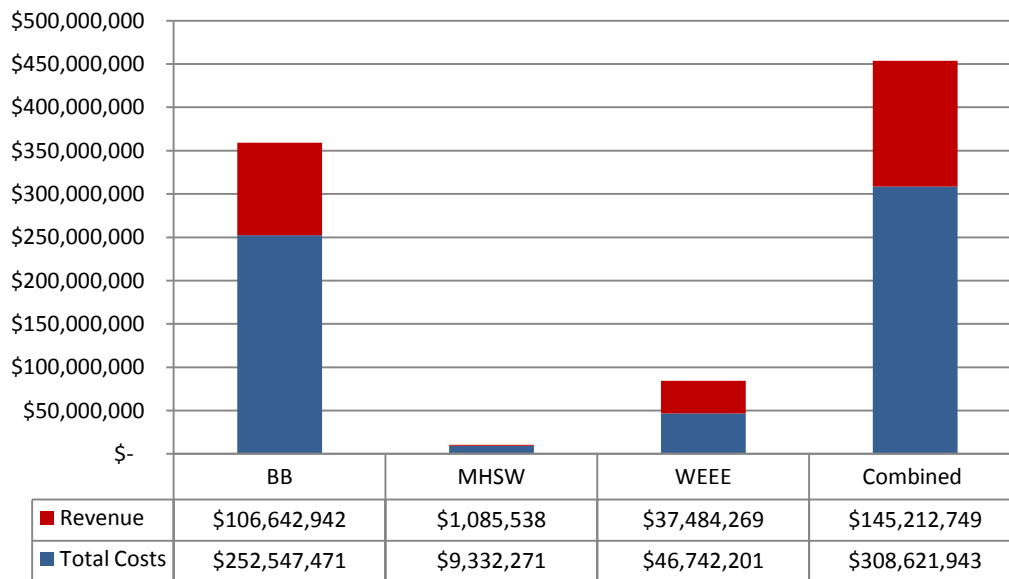


Source: AECOM, 2009

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- The combined gross costs for the three programs are depicted in Figure 6.3. The Blue Box program has a cost in the order of \$250 million. The MHSW and WEEE programs which are respectively in their infancy have costs of approximately \$9 million and \$47 million.
- All three programs combined have a gross cost in the order of \$308 million.

Figure 6-4 2007 Total Program Output (Costs plus Revenues)



Source: AECOM, 2009

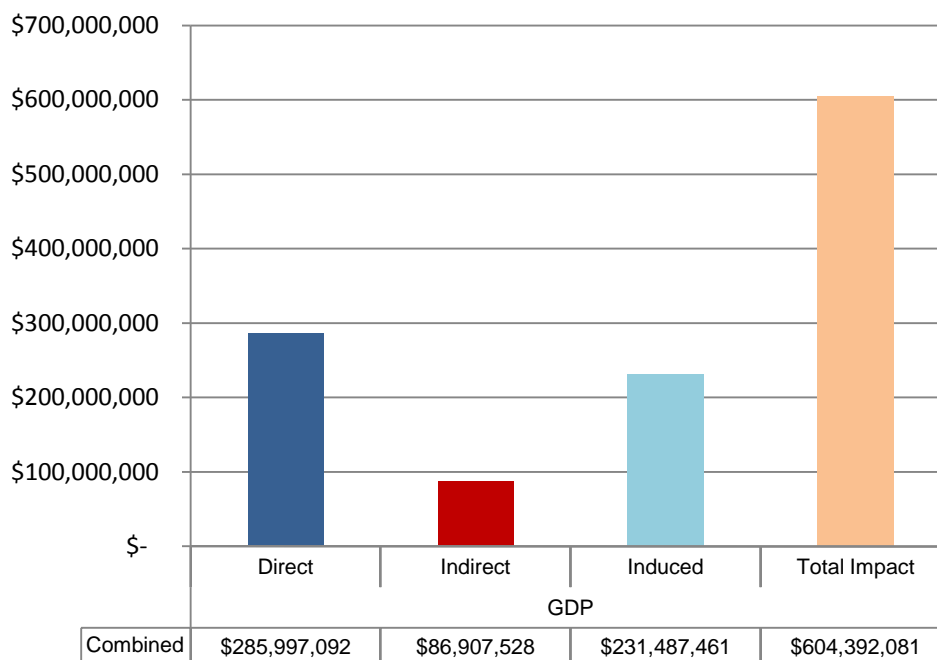
- The aggregation of program costs and revenues is shown in Figure 6-4. For all three programs combined, gross costs total approximately \$309 million and revenues amount to \$145 million.
- The total economic output of the sector (costs plus revenues) is \$454 million.

6.1.3 2007 Program and Upstream Economic Impacts

- The aggregated effects of the 3 recycling programs in terms of GDP, Labour Income and Gross Output are reflected in Figures 6-5 through to 6-7. Total GDP is \$604 million, total Labour Income amounts to \$302 million and total Gross Output is just over \$1.0 billion.
- The total number of FTE jobs attributable the three programs combined is close to 6,200. Direct employment makes up 35% of the total. Indirect and induced jobs respectively account for 19% and 46% of the total (Figure 6-8).
- Taxes generated by the three programs total over \$37 million. The federal share is about 36%, the provincial share approximately 63% and the municipal share less than 1% (Figure 6-9).

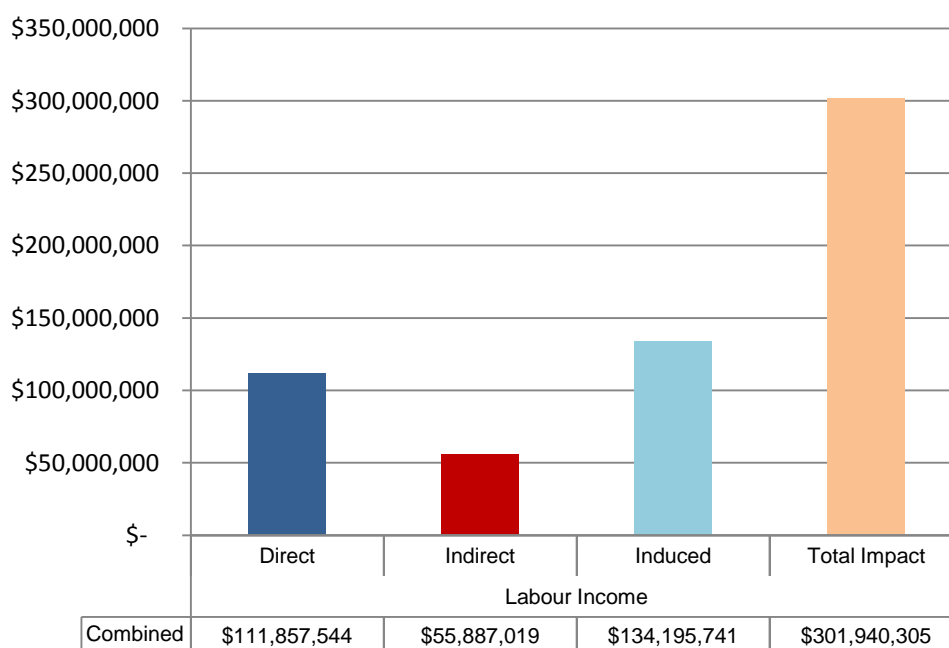
Section 6: Conclusions

Figure 6-5 2007 Combined Program Economic Impacts - GDP



Source: AECOM, 2009

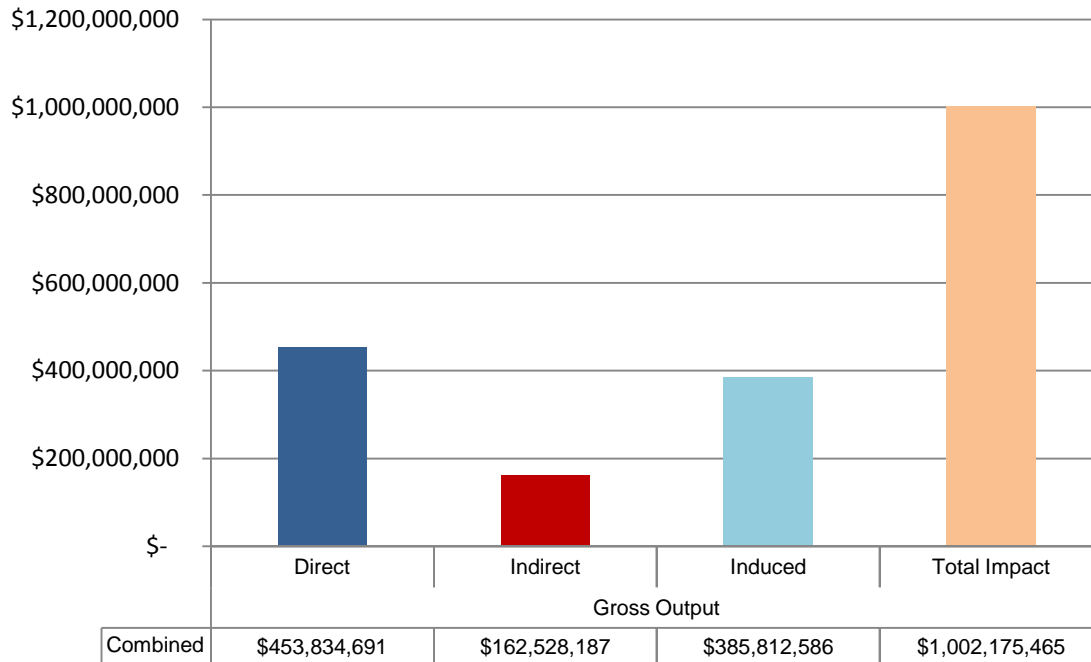
Figure 6-6 2007 Combined Program Economic Impacts – Labour Income



Source: AECOM, 2009

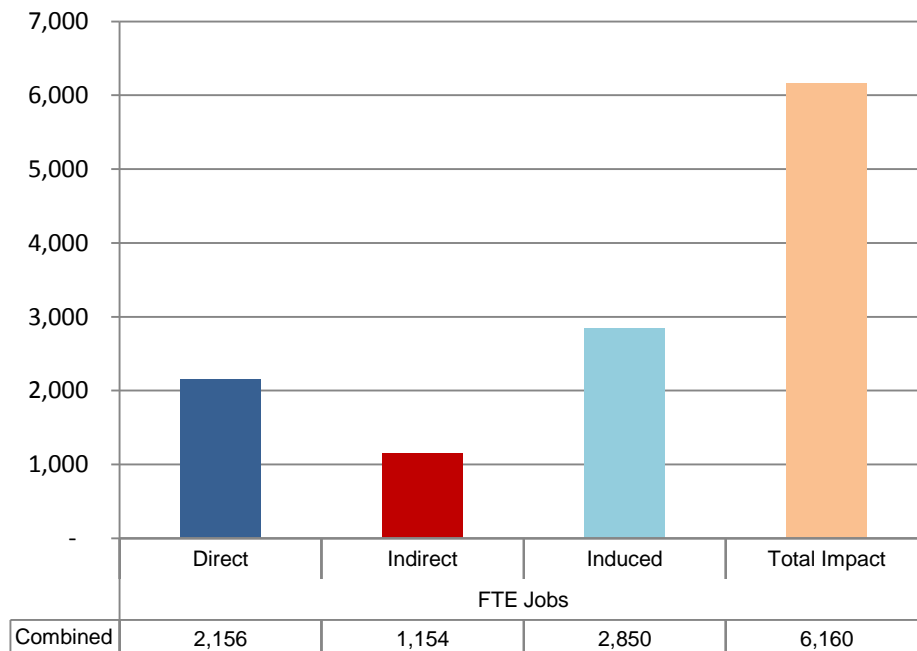
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Figure 6-7 2007 Combined Program Economic Impacts – Gross Output



Source: AECOM, 2009

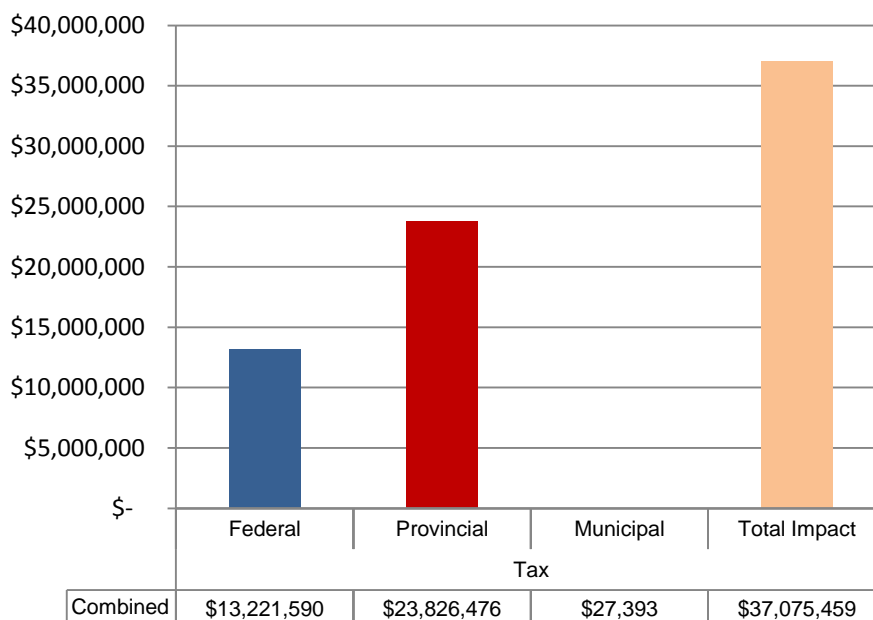
Figure 6-8 2007 Combined Program Economic Impacts – FTE Jobs



Source: AECOM, 2009

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Figure 6-9 2007 Combined Program Economic Impacts – Taxes



Source: AECOM, 2009

6.1.4 2007 Combined Program Upstream and Downstream Effects

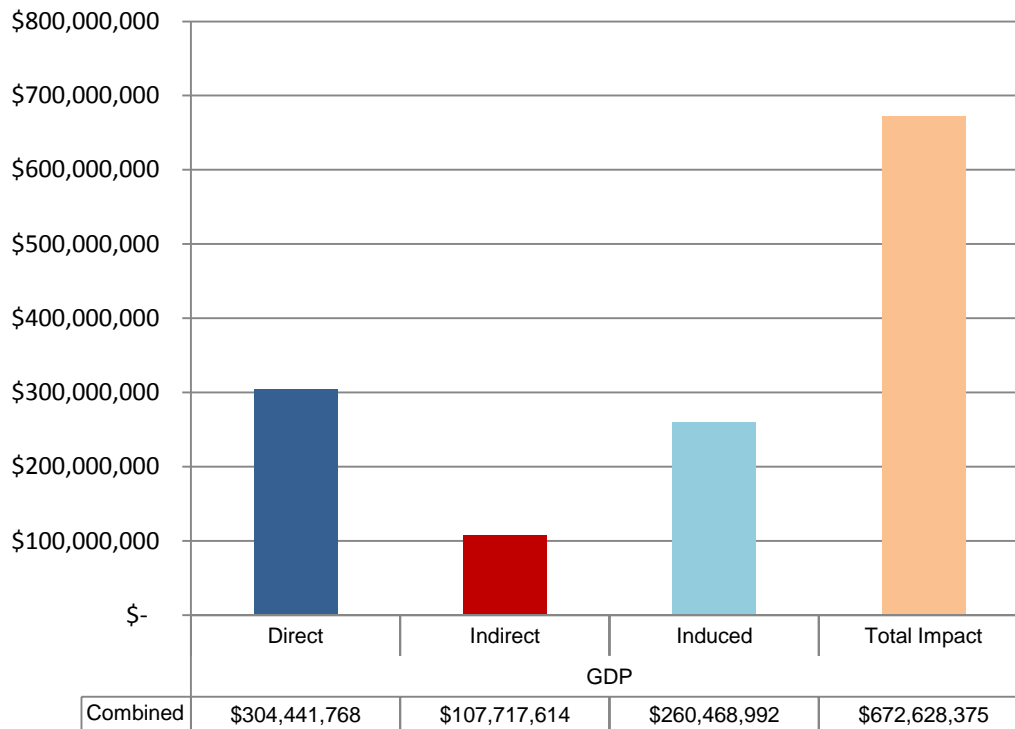
The three programs combined plus the upstream and downstream effects of the programs frame the perspective for this sub-section. The downstream contribution is approximately 11%.

- The total GDP generated by aggregating the recycling programs and the upstream and downstream sector effects is \$673 million (Figure 6-10). In terms of this figure, direct effects account for 45% of the total and indirect effects for 16% and induced for 39%.
- The total Labour Income impact is \$340 million (Figure 6-11). Direct Labour Income represents 36% of the total followed by indirect at 19% and induced at 44%.
- The total Gross Output generated in this perspective is about \$1.1 billion (Figure 6-12). 45% of the contribution to total Gross Output is direct, 16% is indirect and 39% is induced.
- The total FTE Job creation derived from the programs themselves and the downstream sectors they contribute to is 6,900 (Figure 6-13). Of the total jobs 34% are direct, 20% are indirect and 46% are induced.
- The tax generation when program and downstream sectors are aggregated is \$42 million (Figure 6-14). 36% of the monies flow to Federal coffers and close 64% flow to Provincial coffers. The Municipal flow is very minor at \$32,000.

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- It should be noted that there may be a slight double count as a result of this aggregation. However, for the purposes of this report, given the relatively small contribution of recycled commodities to overall production in the downstream industry sectors and the manner in which the I/O Model accounts for waste management in these sectors the over count is judged to be very small.

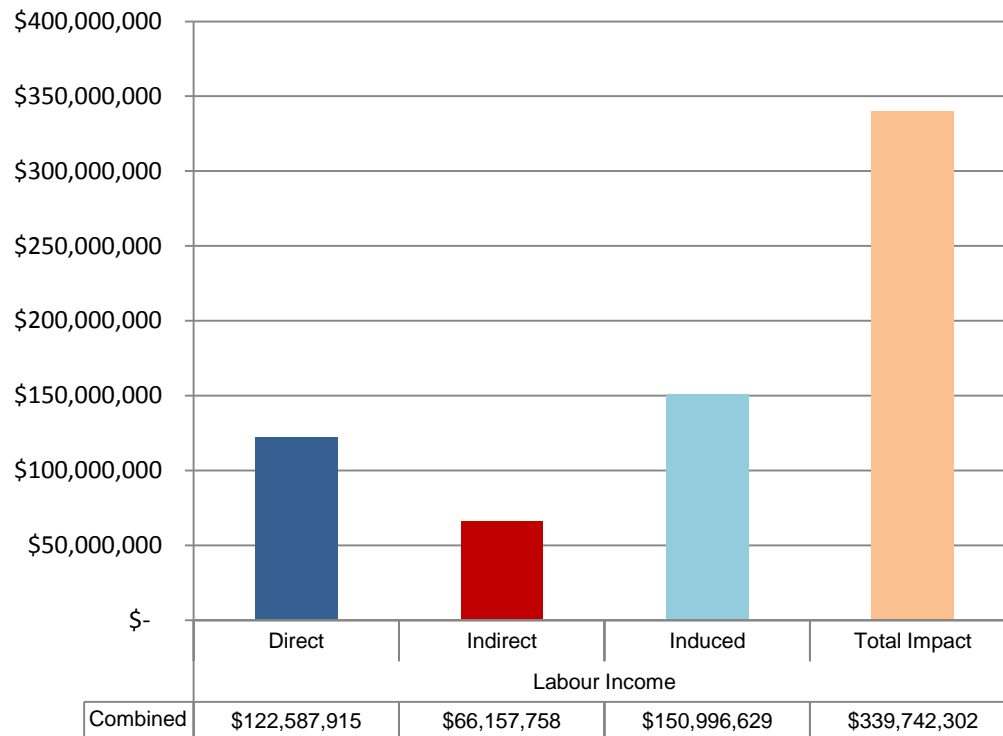
Figure 6-10 2007 Combined Program Upstream and Downstream Economic Effects - GDP



Source: AECOM, 2009

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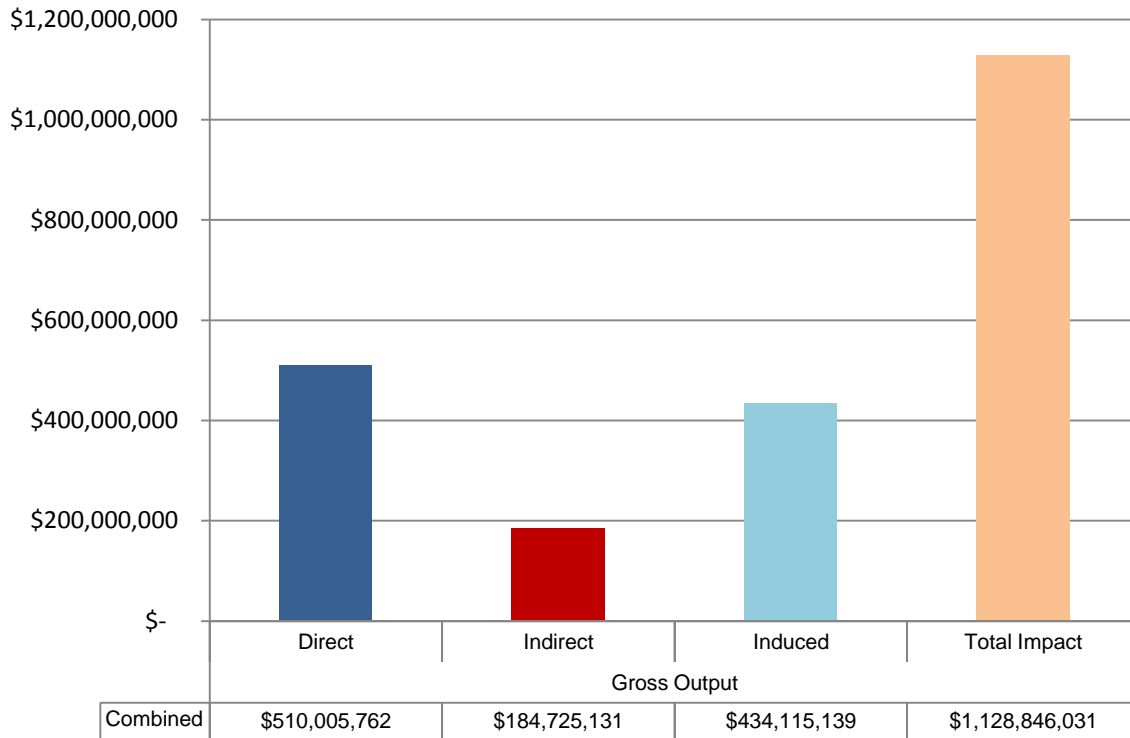
Figure 6-11 2007 Combined Program Upstream and Downstream Economic Effects – Labour Income



Source: AECOM, 2009

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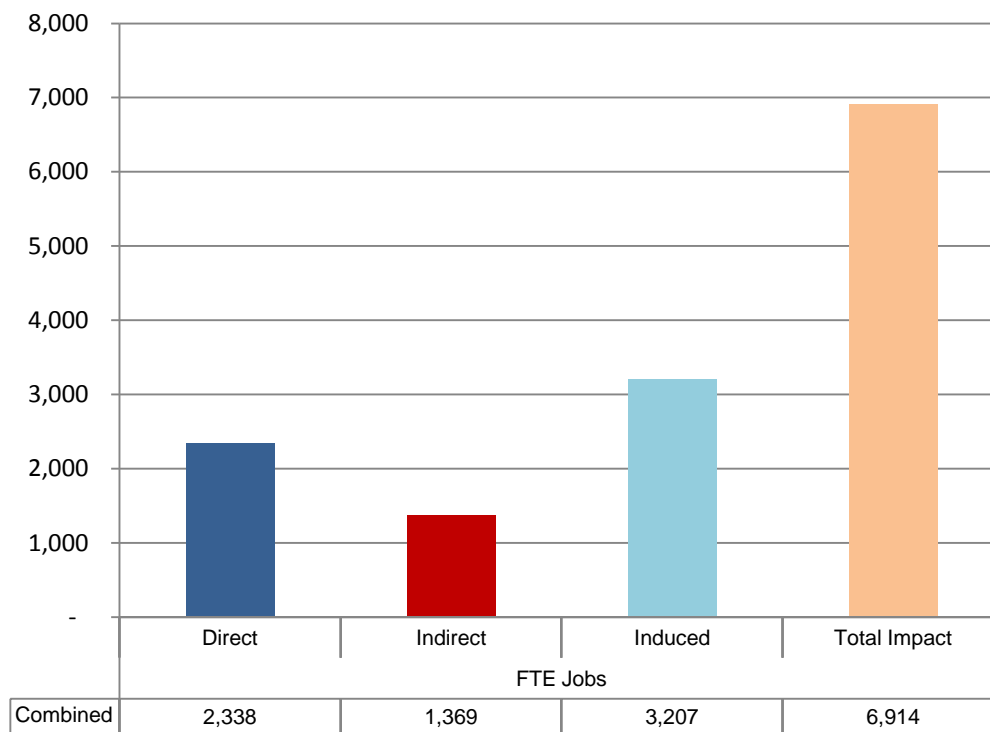
Figure 6-12 2007 Combined Program Upstream and Downstream Economic Effects – Gross Output



Source: AECOM, 2009

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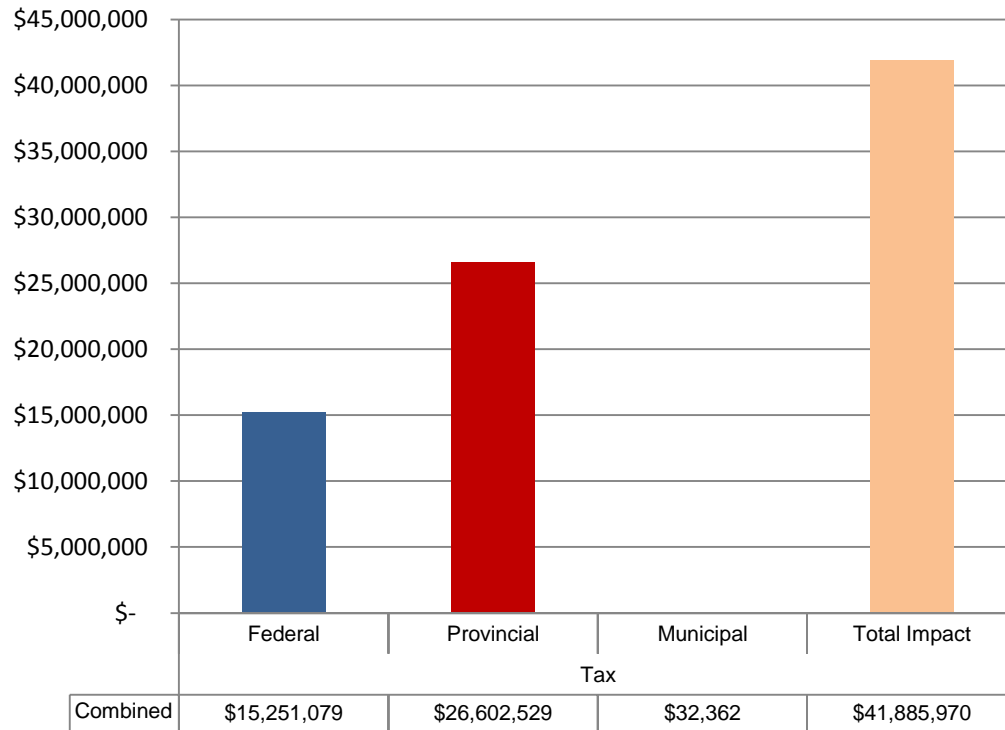
Figure 6-13 2007 Combined Program Upstream and Downstream Economic Effects – FTE Jobs



Source: AECOM, 2009

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Figure 6-14 2007 Combined Program Upstream and Downstream Economic Effects – Tax



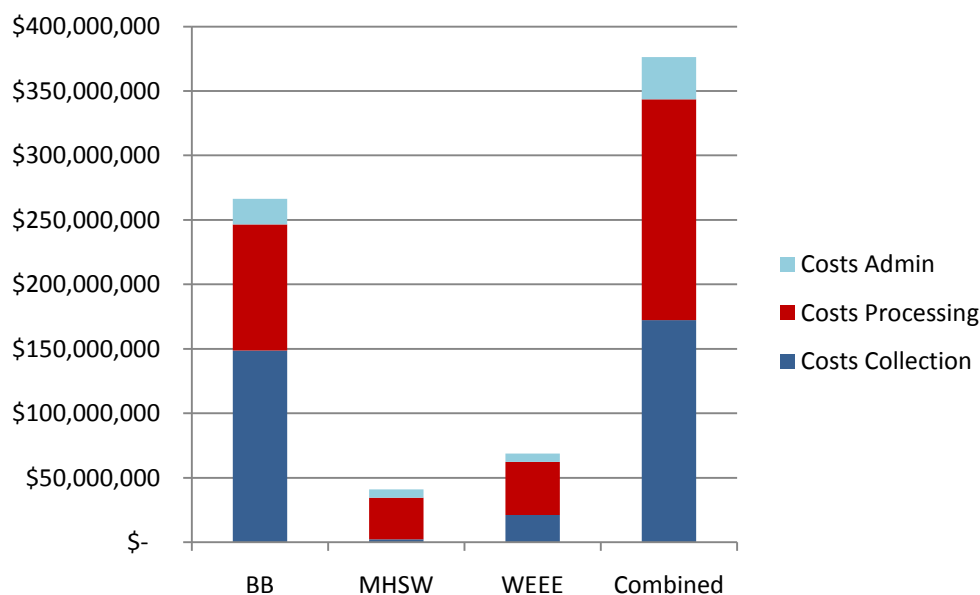
Source: AECOM, 2009

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6.2 2012 Programs

6.2.1 2012 Combined Program Costs, Revenues Upstream Economic Impacts

Figure 6-15 2012 Combined Program Costs

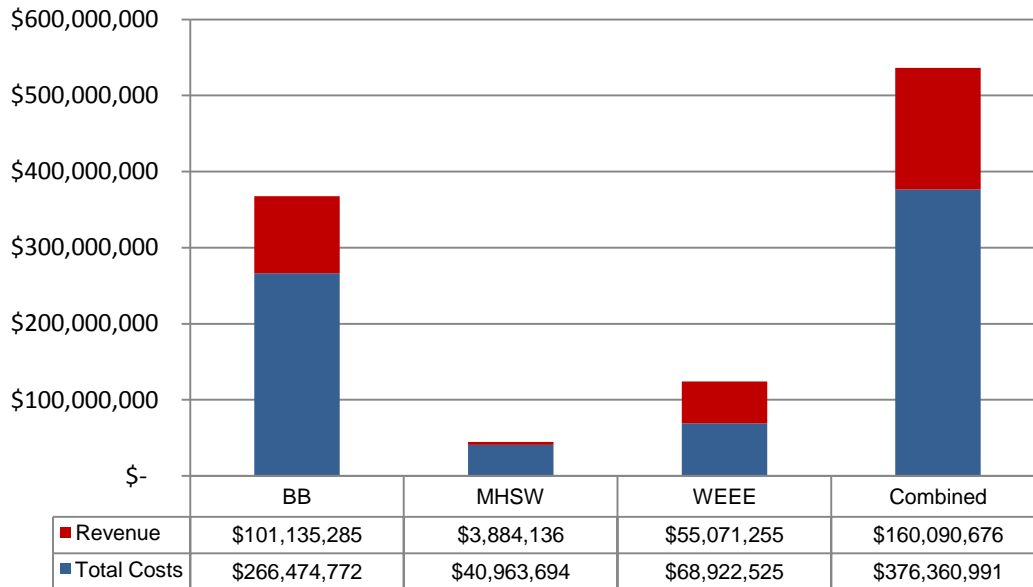


Source: AECOM, 2009

- In 2012, it is projected that the gross cost of the three programs will be \$376 million. This figure is approximately 19% above the corresponding sum for 2007 (Figure 6-15).
- The majority of costs (71%) are attributable to the Blue Box Program.
- Revenues amount to \$160 million and of this sum the Blue Box Program accounts for 63%, the MHSW program for 2% and the WEEE program for 34%.
- The total combined output (costs plus revenues) of all three programs in 2012 amounts to \$536 million, of which 69% is attributable to the Blue Box, 8% to MHSW and 23% to WEEE (Figure 6-16).
- Total GDP output for the combined programs is estimated to be \$714 million in 2012. The corresponding sums for Labour Income and Gross Output are \$357 million and \$1.2 billion, respectively (Figure 6-17 to 6-19).
- The growth in total Gross Output between 2007 and 2012 is 15%.
- In 2012, the total FTE Jobs created among three programs is projected to be 7,281 (Figure 6-20).
- Tax generation from the combined programs is projected to be \$44 million in 2012 (Figure 6-21).

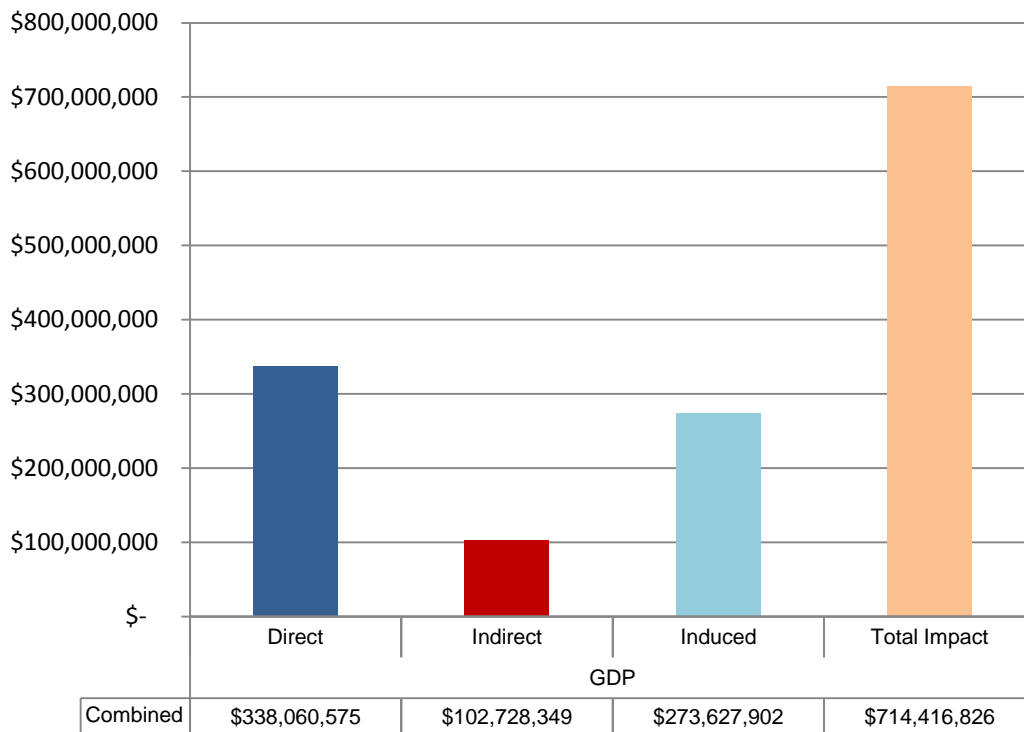
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Figure 6-16 2012 Combined Program Outputs (Costs plus Revenues)



Source: AECOM, 2009

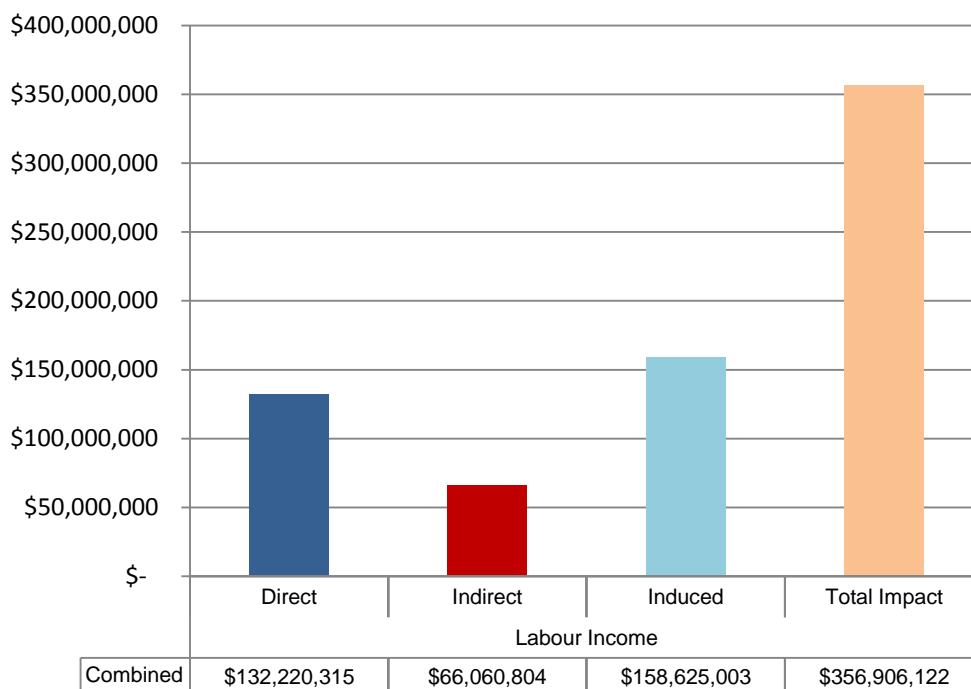
Figure 6-17 2012 Combined Program Economic Effects - GDP



Source: AECOM, 2009

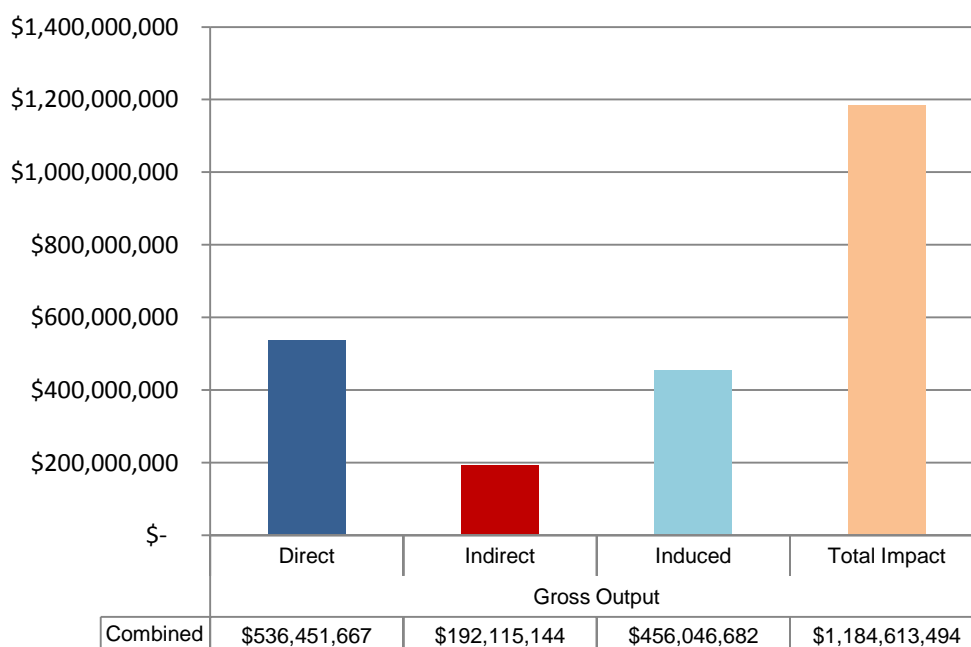
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Figure 6-18 2012 Combined Program Economic Effects – Labour Income



Source: AECOM, 2009

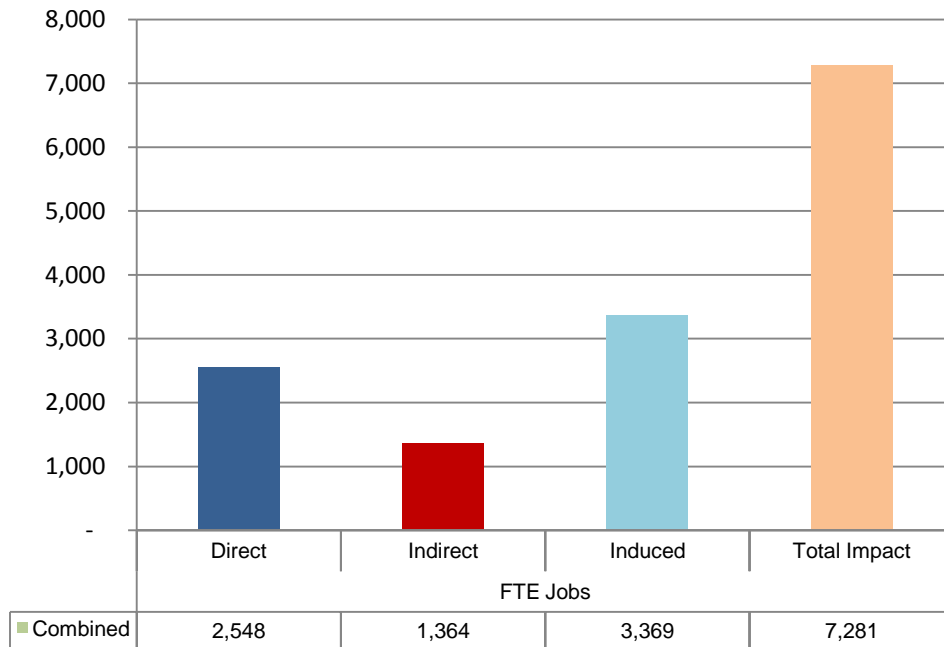
Figure 6-19 2012 Combined Program Economic Effects – Gross Output



Source: AECOM, 2009

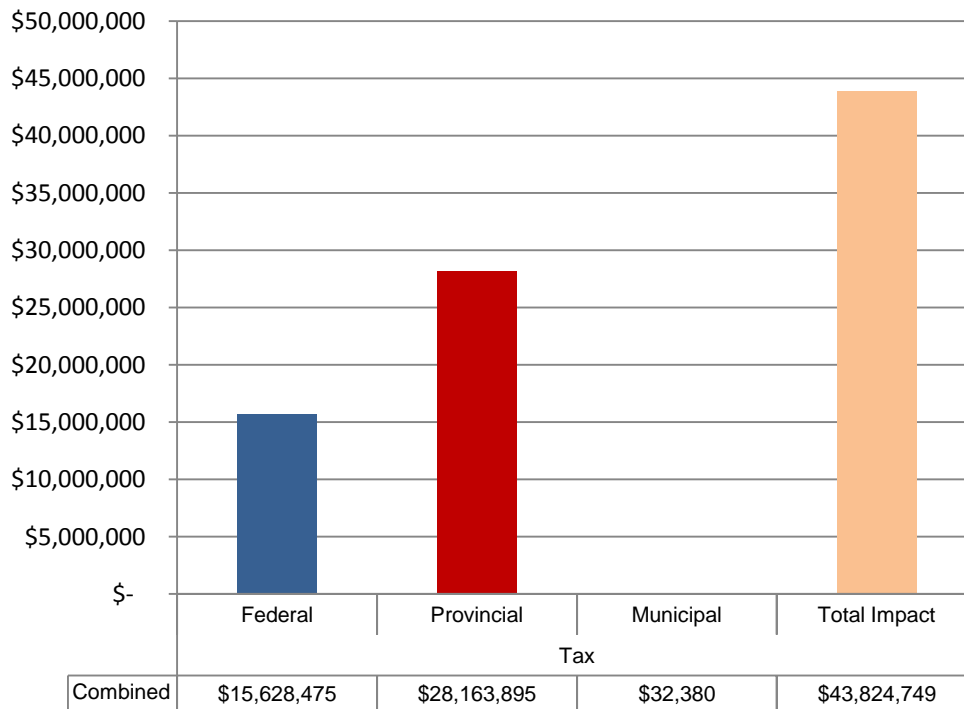
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Figure 6-20 2012 Combined Program Effects – FTE Jobs



Source: AECOM, 2009

Figure 6-21 2012 Combined Program Effects – Taxes

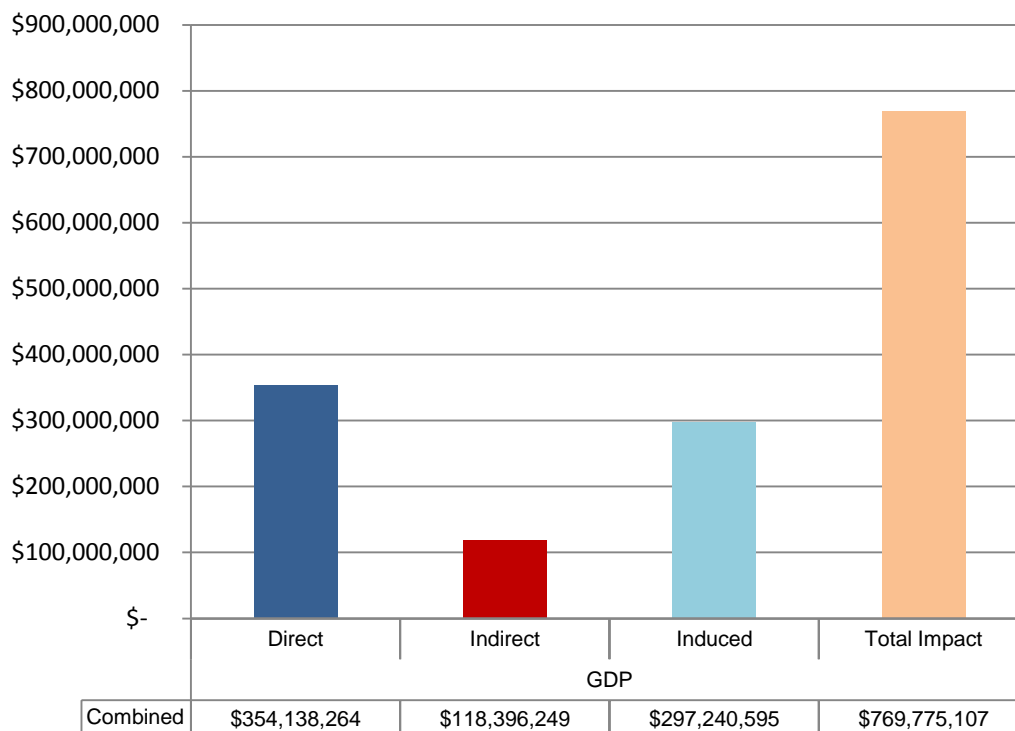


Source: AECOM, 2009

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6.2.2 2012 Combined Program Upstream and Downstream Effects

Figure 6-22 2012 Combined Program Upstream and Downstream Economic Effects - GDP

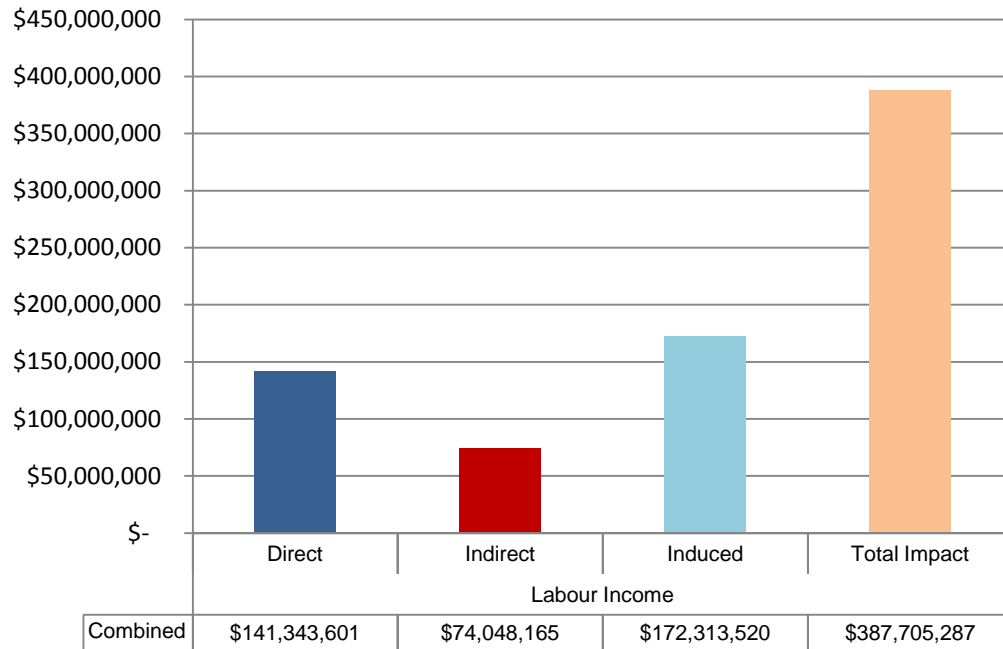


Source: AECOM, 2009

- The total GDP generated by aggregating the recycling programs and the downstream sector effects is \$770 million in 2012 (Figure 6-22). The downstream effect is about 7% percent of this total which is less than it was in 2007 due to a dampening of investment shock because of lower commodity prices.
- The total Labour Income impact is \$388 million with direct income representing 37% of the total followed by indirect at 19% and induced at 44% (Figure 6-23).
- The total Gross Output generated in this perspective is \$1.3 billion. 45% of the contribution to total Gross Output is direct, 16% is indirect and 39% is induced (Figure 6-24).
- The total number of jobs created in 2012 via the programs and downstream sectors is estimated to be approximately 7,890 (Figure 6-25). The apportionments of direct, indirect and induced jobs to the total figure are 34%, 19% and 46%, respectively.
- The taxes generated in 2012 through the programs and associated downstream sectors are estimated to be \$48 million (Figure 6-26). Federal taxes account for 35% of the total while Provincial taxes account for 65%. The municipal tax generation is very small and only accounts for a fraction of a percent of the total.

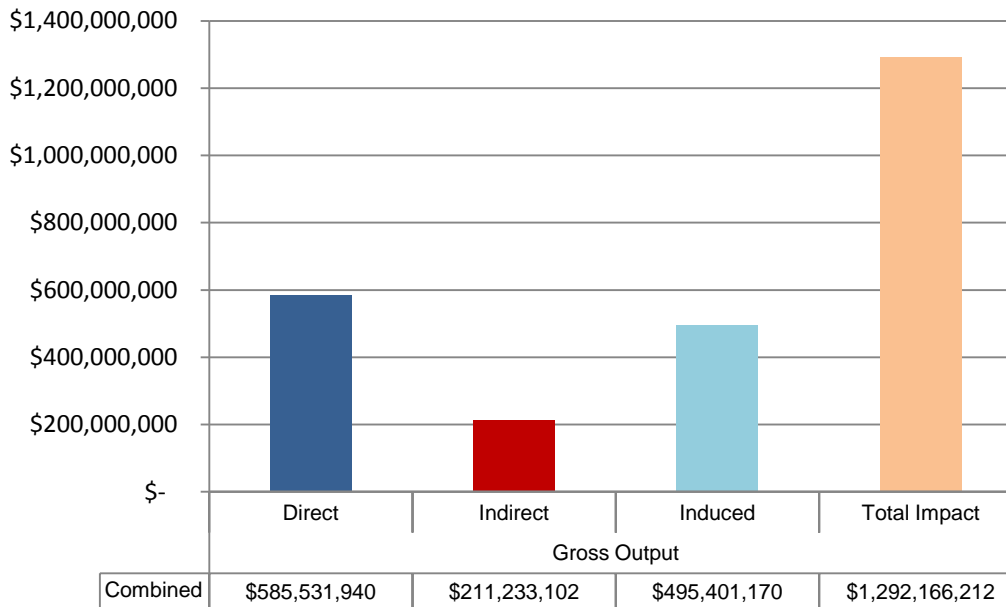
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Figure 6-23 2012 Combined Program Upstream and Downstream Economic Effects – Labour Income



Source: AECOM, 2009

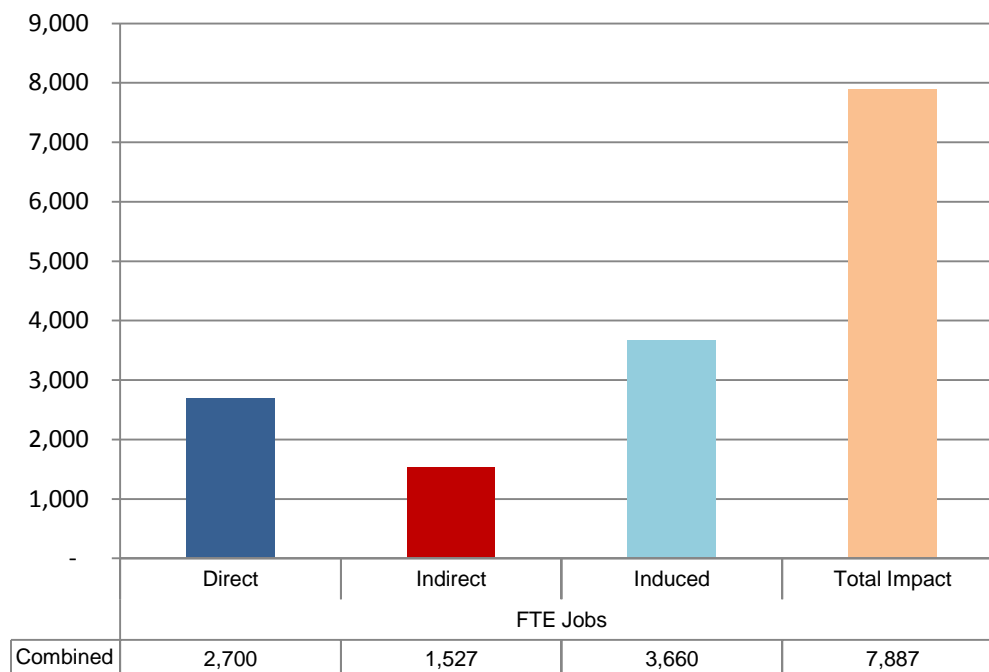
Figure 6-24 2012 Combined Program Upstream and Downstream Economic Effects – Gross Output



Source: AECOM, 2009

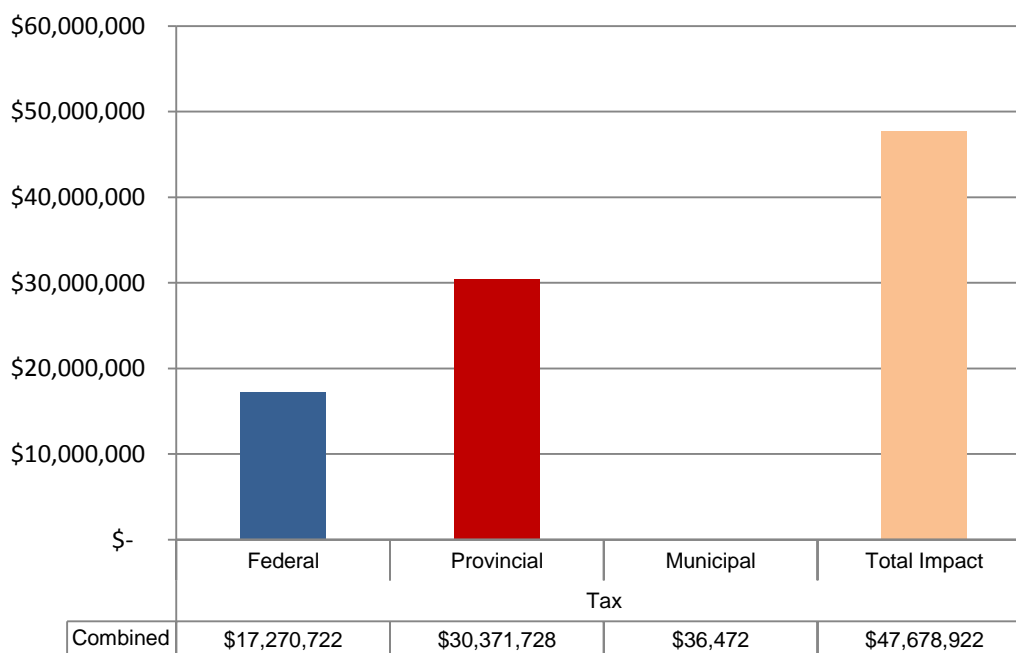
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Figure 6-25 2012 Combined Program Upstream and Downstream Economic Effects – FTE Jobs



Source: AECOM, 2009

Figure 6-26 2012 Combined Program Upstream and Downstream Economic Effects – Taxes



Source: AECOM, 2009

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6.3 MOE Key Program Measurements 2007

6.3.1 Recyclable Programs

- In 2007, the Blue Box Program and the handling of MHSW and WEEE Phase 1 Materials resulted in 2,200 direct jobs, 1,200 indirect jobs and 1,300 induced jobs for a total of 6,202 jobs in the Ontario economy.
- These jobs brought in a combined \$302 million of labour income.
- The programs in combination diverted 940,000 tonnes of material away from provincial landfills
- The three programs generated \$37 million of taxes for the provincial, federal, and municipal governments.
- Every tonne of waste diverted from the landfill results in approximately \$1,100 in economic output, \$320 in labour income, and \$650 in value creation.

In 2007, the Blue Box Program and the handling of MHSW and WEEE Phase 1 Materials resulted in 2,200 direct jobs, 1,200 indirect jobs and 1,300 induced jobs for a total of 6,202 jobs in the Ontario economy.

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6.3.2 Blue Box Program

Table 6-1 Key Economic Program Measurements for the 2007 Blue Box Program

	Direct	Indirect	Induced	Total Impact
Number of Jobs	1,706	913	2,256	4,875
Annual Payroll (\$)	\$88,530,379	\$44,232,144	\$106,210,091	\$238,972,614
Annual Throughput Recycled (t)				902,498
Industrial Output Generated (\$)	\$359,190,413	\$128,633,989	\$305,353,876	\$793,178,278
Sales (\$)				\$106,642,942
Value Added (\$)	\$226,354,255	\$68,783,527	\$183,212,254	\$478,350,037
Tax Revenue (\$)				\$29,343,612
Sales / t material diverted				\$118.16
Jobs / 1000 t material diverted	1.89	1.01	2.50	5.40
Output / t material diverted	\$398	\$143	\$338	\$879
Income / t of material diverted	\$98	\$49	\$118	\$265
Value added / t of material diverted	\$251	\$76	\$203	\$530

- In 2007, the Blue Box Program, through direct, indirect and induced means created 4,875 jobs in Ontario.
- These jobs produced \$239 million of labour income.
- 902,000 tonnes of Blue Box materials were marketed and diverted from the landfill.
- The direct, indirect, and induced economic activities associated with the Blue Box Program were responsible for \$793 million of industrial output.
- The Blue Box Program recovered \$107 million of commodities that were sold direct to industry or to brokers.
- The Blue Box Program generated \$29 million of taxes for the provincial, federal, and municipal government.
- Every tonne of waste diverted from the landfill results in approximately \$120 in material sales, \$880 in economic output, \$270 in labour income, and \$530 in value creation.

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6.3.3 Municipal Hazardous or Special Waste

Table 6-2 Key Economic Program Measurements for Handling MHSW Phase 1 Materials in 2007

	Direct	Indirect	Induced	Total Impact
Number of Jobs	49	26	65	141
Annual Payroll (\$)	\$2,567,698	\$1,282,891	\$3,080,473	\$6,931,062
Annual Throughput Recycled (t)				16,338
Industrial Output Generated (\$)	\$10,417,809	\$3,730,846	\$8,856,356	\$23,005,011
Sales (\$)				\$1,085,538
Value Added (\$)	\$6,565,084	\$1,994,969	\$5,313,812	\$13,873,864
Tax Revenue (\$)				\$851,070
Sales / t material diverted				\$66.44
Jobs / 1000 t material diverted	3.03	1.62	4.00	8.65
Output / t material diverted	\$638	\$228	\$542	\$1,408
Income / t of material diverted	\$157	\$79	\$189	\$424
Value added / t of material diverted	\$402	\$122	\$325	\$849

Source: AECOM, 2009

- In 2007, handling MHSW materials was not done through the Stewardship Ontario MHSW Program.
- In 2007, the handling of MHSW resulted in 141 jobs.
- These jobs produced \$6.9 million of labour income.
- Handling of MHSW Phase 1 Materials by municipal and non-municipal programs resulted in the diversion of 16,000 tonnes of materials from the landfill.
- Handling MHSW Phase 1 materials generated \$23.0 million in industrial output, and created \$13.9 million of value in the provincial economy.
- Handling MHSW Phase 1 materials resulted in \$851,000 of tax revenue being collected by all three tiers of government.
- Every tonne of waste diverted from the landfill results in approximately \$1,400 in economic output, \$400 in labour income, and \$800 in value creation.

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6.3.4 Waste Electrical & Electronic Equipment Program

Table 6-3 Key Economic Program Measurements for Handling WEEE Phase 1 Materials in 2007

	Direct	Indirect	Induced	Total Impact
Number of Jobs	400	214	529	1,143
Annual Payroll (\$)	\$20,759,466	\$10,371,984	\$24,905,178	\$56,036,628
Annual Throughput Recycled (t)				18,700
Industrial Output Generated (\$)	\$84,226,470	\$30,163,352	\$71,602,354	\$185,992,175
Sales (\$)				\$37,484,269
Value Added (\$)	\$53,077,753	\$16,129,032	\$42,961,395	\$112,168,180
Tax Revenue (\$)				\$6,880,776
Sales / t material diverted				\$2,004.51
Jobs / 1000 t material diverted	21.39	11.45	28.29	61.13
Output / t material diverted	\$4,504	\$1,613	\$3,829	\$9,946
Income / t of material diverted	\$1,110	\$555	\$1,332	\$2,997
Value added / t of material diverted	\$2,838	\$863	\$2,297	\$5,998

Source: AECOM, 2009

- In 2007, handling WEEE Phase 1 materials was not done through Ontario Electronic Stewardship's WEEE Program.
- In 2007 the handling of WEEE Phase 1 material resulted in 1,143 jobs.
- These jobs produced \$56 million of labour income.
- Handling of MHSW Phase 1 Materials by municipal and non-municipal programs resulted in the diversion of 19,000 tonnes of materials from the landfill.
- Handling WEEE Phase 1 materials generated \$186.0 million in industrial output, and created \$112.2 million of value in the provincial economy.
- Handling MHSW Phase 1 materials resulted in \$6.9 million of tax revenue being collected by all three tiers of government.
- Every tonne of waste diverted from the landfill results in approximately \$9,900 in economic output, \$2,300 in labour income, and \$6,000 in value creation.

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6.4 End Use manufacturing

Table 6-4 Key Economic Program Measurements for End Use Manufacturing with Recycled Materials in 2007

	Direct	Indirect	Induced	Total Impact
Number of Jobs	183	215	357	755
Annual Payroll (\$)	\$10,730,371	\$10,270,739	\$16,800,888	\$37,801,997
Annual Throughput Recycled (t)	2,707,494	2,707,494	2,707,494	2,707,494
Annual Throughput Marketed Ontario (t)	1,091,703	1,091,703	1,091,703	1,091,703
Industrial Output Generated (\$)	\$56,171,071	\$22,196,943	\$48,302,552	\$126,670,566
Value Added (\$)	\$18,444,676	\$20,810,086	\$28,981,531	\$68,236,294
Tax Revenue (\$)	\$-	\$-	\$-	\$4,810,511
Jobs / 1000 t material diverted	0.50	0.59	0.98	2.07
Output / t material diverted	\$154	\$61	\$133	\$348
Income / t of material diverted	\$29.49	\$28.22	\$46.17	\$103.88
Value added / t of material diverted	\$50.69	\$57.19	\$79.64	\$187.51
indirect jobs sustained / \$1000 labour income	-	0.045	-	0.045

Source: AECOM, 2009

- In 2007, a significant portion of Blue Box recycled materials fed into the paper manufacturing, plastics and rubber manufacturing, non-metallic mineral product manufacturing, and primary metal manufacturing. A much smaller portion of MHSW and WEEE phase 1 materials were used in Ontario's primary metal manufacturing and plastics and rubber manufacturing.
- The fraction of end-use manufacturing related to recycled material inputs resulted in 755 jobs.
- These jobs produced \$38 million of labour income.
- The end-use manufacturing related to recycled materials generated \$348 million in industrial output, and created \$188 million of value in the provincial economy.

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6.5 Remanufacturing and Reuse Industries

Table 6-5 Key Economic Program Measurements for Industries that Remanufacture and Reuse Materials in 2007

	Direct	Indirect	Induced	Total Impact
Number of Jobs	178	95	235	509
Annual Payroll (\$)	\$9,238,823	\$4,615,963	\$11,083,836	\$24,938,622
Annual Throughput Recycled (t)				8,636
Industrial Output Generated (\$)	\$37,484,269	\$13,423,941	\$31,866,014	\$82,774,225
Value Added (\$)	\$23,621,799	\$7,178,088	\$19,119,601	\$49,919,488
Tax Revenue (\$)				\$3,062,231
Jobs / 1000 t material diverted	21	11	27	59
Output / t material diverted	\$4,340	\$1,554	\$3,690	\$9,585
Income / t of material diverted	\$1,070	\$535	\$1,283	\$2,888
Value added / t of material diverted	\$2,735	\$831	\$2,214	\$5,780

Source: AECOM, 2009

- In 2007, a significant portion of WEEE Phase 1 materials were remanufactured and reused to create economic value in Ontario.
- The remanufacture and reuse of WEEE Phase 1 materials resulted in 509 jobs.
- These jobs produced \$24.9 million of labour income.
- The remanufacture and reuse of WEEE Phase 1 materials generated \$82.8 million in industrial output, and created \$49.9 million of value in the provincial economy.
- Every tonne of Phase 1 WEEE Material remanufactured or reused in Ontario results in approximately \$9,600 in economic output, \$2,900 in labour income, and \$5,800 in value creation.

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6.6 Recycling Equipment Manufacturing and Other Indirect Industries

Table 6-6 Key Economic Program Measurements for Recycling Equipment Manufacturing and Other Indirect Industries in 2007

	2007
Number of Jobs	1,154
Annual Payroll (\$)	\$55,887,019
Annual Throughput Recycled (t)	902,498
Industrial Output Generated (\$)	\$162,528,187
Value Added (\$)	\$86,907,528
Jobs / 1000 t material diverted	1.23
Output / t material diverted	\$173
Income / t of material diverted	\$60
Value added / t of material diverted	\$93

Source: AECOM, 2009

- In 2007, the Blue Box program, the handling of MHSW Phase 1 materials, and the handling of WEEE Phase 1 materials required the support of Ontario recycling equipment manufacturers and other indirect industries.
- 1,154 jobs were created in Ontario's recycling equipment manufacturing and other indirect industries to support Blue Box Program, the handling of MHSW Phase 1 material, and the handling of WEEE Phase 1 material.
- These jobs produced \$55.9 million of labour income.
- The indirect industries that support the direct recycling activities generated \$162.5 million in industrial output, and created \$86.9 million of value in the provincial economy.
- Every tonne of material diverted in Ontario results in approximately \$173 in economic output, \$60 in labour income, and \$93 in value creation in supporting industries.

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6.7 Solid Waste Disposal

Table 6-7 Key Economic Program Measurements for Solid Waste Disposal in 2007

	2007			
	Direct	Indirect	Induced	Total Impact
Number of Jobs	2,911	1,558	1,773	6,243
Annual Payroll (\$)	\$151,072,576	\$75,479,898	\$85,295,901	\$311,848,375
Annual Throughput Disposed (t)				9,372,173
Industrial Output Generated (\$)	\$612,940,116	\$219,507,340	\$245,254,872	\$1,077,702,328
Value Added (\$)	\$386,261,989	\$117,375,580	\$(44,922,916)	\$458,714,654
Tax Revenue (\$)				\$35,166,220
Jobs / 1000 t material disposed	0.31	0.17	0.19	0.67
Output / t material disposed	\$65	\$23	\$26	\$115
Income / t of material disposed	\$16	\$8	\$9	\$33
Value added / t of material disposed	\$41	\$13	\$(5)	\$49

Source: AECOM, 2009

- In 2007, approximately 9.4 million tonnes of waste were disposed in Ontario.
- The economic impacts of solid waste disposal were calculated by taking annual provincial disposal rates and multiplying them by average municipal tipping fees, for landfills that have gas collection.
- The average per tonne cost of solid waste disposal at municipalities with landfills with landfill gas collection is \$65.40/tonne. This was calculated based on information in the 2007 Ontario Municipality Benchmarking Initiative's 2007 Performance Benchmarking Report.
- The direct gross economic output of the Solid Waste Disposal Industry in 2007 was \$613 million.
- The disposal of waste resulted in 6,200 jobs.
- These jobs produced \$312 million of labour income.
- Solid Waste Disposal created \$1.1 billion in industrial output, and created \$459 million of value in the provincial economy.
- Handling MHSW Phase 1 materials resulted in \$35 million of tax revenue being collected by all three tiers of government.
- Every tonne of waste disposed in the landfill results in approximately \$115 in economic output, \$33 in labour income, and \$49 in value creation.

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6.8 Industry Comparisons

6.8.1 Comparison of Economic Impacts within the Waste Management Industry in Ontario – 2007

Table 6-8 Total Economic Impacts by Type of Waste Management Activity

	BB	MHSW	WEEE	Total Recycling	Waste Disposal
Number of Jobs	4,875	141	1,143	6,160	6,243
Annual Payroll (\$)	\$238,972,614	\$6,931,062	\$56,036,628	\$301,940,305	\$311,848,375
Annual Throughput Recycled (t)	902,498	16,338	18,700	937,536	9,372,173
Industrial Output Generated (\$)	\$793,178,278	\$23,005,011	\$185,992,175	\$1,002,175,465	\$1,077,702,328
Sales (\$)	\$106,642,942	\$1,085,538	\$37,484,269	\$145,212,749	
Value Added (\$)	\$478,350,037	\$13,873,864	\$112,168,180	\$604,392,081	\$458,714,654
Tax Revenue (\$)	\$29,343,612	\$851,070	\$6,880,776	\$37,075,459	\$35,166,220
Sales / t material diverted	\$118.16	\$66.44	\$2,004.51	\$154.89	
Jobs / 1000 t material diverted	5.40	8.65	61.13	6.57	0.67
Output / t material diverted	\$879	\$1,408	\$9,946	\$1,069	\$115
Income / t of material diverted	\$265	\$424	\$2,997	\$322	\$33
Value added / t of material diverted	\$530	\$849	\$5,998	\$645	\$49

Source: AECOM, 2009

- Table 6-8 shows the total economic impacts of the by type of waste management activity.
- Within Ontario's waste management industry, Waste Disposal is responsible for the greatest amount of employment (6,200), but creates only 0.7 jobs per 1,000 tonnes of waste disposed.
- The Blue Box Program is the recycling activity that employs the greatest number of Ontarians (4,400), but creates the fewest jobs per 1,000 tonnes diverted (5.4 jobs / 1,000 t diverted).
- Handling Phase 1 MHSW materials in 2007 had a very a small total impact on employment in Ontario (141 jobs), but created 9 jobs per every 1,000 tonnes diverted from the landfill.
- Handling Phase 1 WEEE materials in 2007 employed 1,143 workers in Ontario and had the greatest impact on employment per tonne of waste diverted from the landfill (61 jobs / 1,000 t diverted).
- In 2007, the Blue Box Program, and the handling of Phase 1 MHSW and WEEE materials resulted in 75% of the economic output of Waste Disposal activities in Ontario.

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6.8.2 Comparison of Recycling Programs with other Ontario Industries

Table 6-9 Jobs, Average Salaries, Total Payroll, and GDP Across Key Ontario Industries - 2007

	Recycling Programs	Waste Disposal	Automobile Manufacturing	Food Manufacturing	Chemicals Manufacturing	Primary Metals Manufacturing	Finance, Insurance, Real Estate and Leasing	Ontario
Number of Direct Jobs	2,156	2,911	95,528	57,514	24,630	30,752	474,400	7,512,322
Annual Wages / Job	\$51,889	\$51,897	\$59,378	\$37,303	\$51,679	\$61,067	\$51,217	\$42,453
Total Wages and Salaries	\$111,857,544	\$151,072,576	5,672,321,000	\$2,145,464,000	1,272,857,000	1,877,944,000	\$24,297,287,872	\$318,923,000,000
GDP	\$285,997,092	\$386,261,989	20,621,741,000	\$10,006,613,000	7,648,157,000	\$7,610,736,000	\$110,660,000,000	\$543,313,000,000

Source: AECOM, 2009

- Table 6-9 shows the direct economic impacts of the studied recycling programs and other key Ontario industries.
- In 2007, the combined Blue Box program and handling of MHSW and WEEE Phase 1 materials directly contributed \$300 million of value to the Ontario economy.
- This contribution to the provincial GDP from recycling was significant yet smaller than the contribution from some other industries such as: Automobile manufacturing \$20.6 billion; Food Manufacturing \$10 billion; Chemical and Primary Metal Manufacturing \$7,600,000,000 each; Finance, Insurance, Real Estate and Leasing \$110.7 billion.

In 2007, the combined Blue Box program and handling of MHSW and WEEE Phase 1 materials directly contributed \$300 million of value to the Ontario economy.

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Table 6-10 Jobs, Average Salaries, Total Payroll, and GDP as a Percentage of the Total Ontario Economy - 2007

	Recycling Programs	Waste Disposal	Automobile Manufacturing	Food Manufacturing	Chemicals Manufacturing	Primary Metals Manufacturing	Finance, Insurance, Real Estate and Leasing	Ontario
Number of Direct Jobs	0.03%	0.04%	1.27%	0.77%	0.33%	0.41%	6.31%	100.00%
Annual Wages / Job	122.23%	122.25%	139.87%	87.87%	121.73%	143.85%	120.64%	100.00%
Total Wages and Salaries	0.04%	0.05%	1.78%	0.67%	0.40%	0.59%	7.62%	100.00%
GDP	0.05%	0.07%	3.80%	1.84%	1.41%	1.40%	20.37%	100.00%

Source: AECOM, 2009

- While in 2007 Ontario's combined recycling efforts contributed 0.03% of the jobs in Ontario, jobs in the recycling industry earned 122% of the provincial average in salary.
- The average salaries paid in recycling are greater than the average salaries in the Finance, Insurance, Real Estate and Leasing industry.

While in 2007 Ontario's combined recycling efforts contributed 0.03% of the jobs in Ontario, jobs in the recycling industry earned 122% of the provincial average in salary

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6.9 Conclusions from US studies

Several studies have been undertaken in the United States, which sought to address the economic value of recycling industry. The studies have evolved over time in an effort to grapple with the task of allocating economic value to the various components of the recycling industry. A few of these studies are summarized in this section. These summaries note the main conclusions from each study, as well as the methodological differences between that study and the AECOM study of recycling in Ontario. These differences are important to note since the interim results of this report may, in some cases, be quite different than those reported in the US studies.

Table 6-11 Summary of US studies and Comparisons to AECOM Ontario study.

Study	Main Findings	Main Differences
Beck (2000) Florida Recycling Economic Information Study	<ul style="list-style-type: none"> 3,700 recycling and reuse establishments Total employment 32,000 Total annual payroll of \$765 million Total annual revenue of \$4.4 billion 	<ul style="list-style-type: none"> Scope of study beyond household recyclables, hazardous waste, and electronic equipment Also included remanufacturing and reuse, as well as IC&I and construction recycling
Krieger (2001), Michigan Recycling Measurement Project: The Economic Impact of Recycling	<p>For Recycled Materials Processing:</p> <ul style="list-style-type: none"> Total annual revenues of \$1.9 billion Total employment 5,028 Total annual payroll \$137 million 	<ul style="list-style-type: none"> Study scoped to include only materials processors Does not specify sources of recyclables, most likely also includes IC&I and construction recycling – could also include out-of-state material sources Does not report on commodity types or make any inferences about downstream economic effects (beyond processing stage)
Goldman and Ogishi (2001), The Economic Impact of Waste Disposal and Diversion in California	<p>For waste disposal and diversion:</p> <ul style="list-style-type: none"> \$9 billion in sales \$21 billion in output impacts \$8 billion in income impacts \$11 billion in value-added impacts 179,000 additional jobs 	<ul style="list-style-type: none"> Analysis by commodity type, but also included materials other than residential blue box, hazardous, or electronic recycling programs (such as yard waste, IC&I recycling) Study included waste-to-energy facilities and composting facilities Focus only on waste diversion sector and not downstream effects (processing or manufacturing)

Section 6: Conclusions

Study	Main Findings	Main Differences
	<p>Diversion vs. Disposal</p> <ul style="list-style-type: none"> Sales and value-added impacts are doubled for diversion Output, income and jobs double 	
Beck (2001), US Recycling Economic Information Study	<ul style="list-style-type: none"> National level report Culmination of several state-level studies 56,061 recycling and reuse establishments Total employment 1.1 million people Total annual payroll \$37 billion Total annual revenue \$236 billion Recycling manufacturing has most economic impact (when compared to collection, processing and reuse) Largest sectors of recycling manufacturing are (in order) paper, paperboard and deinked market pulp mills, steel mills, plastic converters and iron and steel foundries 	<ul style="list-style-type: none"> Overestimation of economic activity Double counting as materials flow within, between, and out of state Double counting from summing of direct, induced and indirect economic effects (can be up to 15%) Assumed 100% reliance on recycling, when in face many industries use only a percentage of recycled goods (and therefore 100% of that industry's economic contribution cannot be attributed to recycling) Scope of study beyond household recyclables, hazardous waste, and electronic equipment Also included remanufacturing and reuse, composting, as well as IC&I and construction recycling
DSM Environmental and MSW Consultants (2009), Recycling Economic Information Study Update: Delaware, Main, Massachusetts, New York and Pennsylvania	<ul style="list-style-type: none"> Update on Beck (2001) study based on improved methodology Examined recycling industry, recycling reliant industries, and reuse/remanufacturing industries for 5 states Total of 11,378 establishments Total of employment of 104,885 Total annual payroll of \$4.2 billion Total of \$35 billion in gross receipts Analysis by commodity type 	<ul style="list-style-type: none"> Scope of study beyond household recyclables, hazardous waste, and electronic equipment Also included remanufacturing and reuse, composting, as well as IC&I and construction recycling Created state specific multipliers from survey data Did not address value-add

Source: AECOM, 2009

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In summary, the preceding US studies have taken different approaches to quantifying the economic impacts of recycling at various geographical levels. The main differences, across the board, between these studies and the AECOM study at hand, is the scope of the studies, which include many more recycling sources than municipal BB, HHSW and WEEE programs. An excellent example of this significance can be drawn by looking at the steel industry, which derives a very small proportion of steel (most often from cans) from Blue Box sources and relies more heavily on material sourced from the IC&I sector and construction and demolition activity. The study at hand is more focused in scope to examine the economic impacts of these three recycling programs. Therefore, direct comparisons are not easily made between these US studies and the subject study.

Direct comparisons are not easily made between these US studies and the AECOM study.

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6.10 Overall Conclusions

Employment

- In 2007, the recycling industry, for all 3 programs, created 5,232 jobs, and is expected to experience moderate growth to 2012.
- The average salary in the recycling industry of \$52,000 / year is 1.22 times the provincial average and is greater than the average salary in the finance industry.

Diversion

- There was a 25% growth in the amount of Blue Box materials diverted between 2002 and 2007.
- Combined, the 3 recycling program diverted 937,000 tonnes in 2007. This is expected to increase by 9% in 2012, with most of the growth attributable to the MHSW and WEEE programs.

Program Costs and Revenues

- These combined programs have a cost of \$315 million, and generate revenues of \$142 million in 2007.
- The combined costs of these programs are projected to increase 19% by 2012, to \$357 million.
- The revenues associated with these programs are forecast to increase by 9%, generating \$155 million in 2012.

Contribution to the Economy

- In 2007, the three recycling programs resulted in \$604 million in gross domestic product.
- This number is projected to grow by \$68 million in 2012 to a total of \$975 million.
- The recycling industry makes up a very small portion of GDP in the Ontario economy (<0.1%).

Comparisons

- For every tonne of waste disposed, \$50 of value is created
- For every tonne of Blue Box materials diverted from the landfill, \$530 of economic value is created.
- For every tonne of MHSW Phase 1 materials diverted from the landfill, \$850 of economic value is created.
- For every tonne of WEEE Phase 1 materials diverted from the landfill, \$6,000 of economic value is created.
- The Ontario recycling industry is approximately 75% the size of the province's disposal industry as measured by GDP.

Other Studies

- The focus of this study (on the Blue Box, MHSW, and WEEE programs) is more narrow in scope than the recycling programs examined in previous US studies, and therefore the outputs are not directly comparable.

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6.11 Recommendations for Future Studies

1. We recommend that the MOE work with the WDO to annually track the disposition of program materials to end users and brokers. In the case of the latter, information also needs to be assembled on the geographic end destinations for brokered materials.
2. As part of this study it was hoped that a list of recycling industries could be readily assembled. Unfortunately this was not the case. An enumeration of these industries was not readily available and when organizations closely associated with the recycling industry were queried about this information they suggested significant effort would be required to produce it. Should the MOE wish to have this information we recommend that an initiative to be launched to assemble it.
3. We recommend that the MOE solicit cooperation and data from end users of recycled materials to gain better insight into the importance of recycled materials in their industry as well as insights into constraints and opportunities associated with recycled material usage.
4. Globally, economies are volatile at this time given a world-wide recession. This recession has had a profound effect on commodity prices for recycled materials and made it very difficult to predict future price structures. It is recommended that the MOE update some of the analysis in this report when the economic picture has stabilized and future commodity prices can be more confidently projected.
5. Both the WEEE and MHSW programs are in their infancy and consequently their baseline data is limited. More accurate analysis can be derived with better baseline data in a year's time. We recommend that the MOE update the economic analysis of the WEEE and MHWSW programs once more baseline data is available.
6. The re-use and refurbishment markets for WEEE materials are poorly understood at present. We recommend that the MOE work to better understand these markets and the contributions made by the WEEE program. It is important to understand this relationship because the derived economic value is a critical dimension of the subject program.
7. The US studies reviewed in this document looked at the economic contributions of recycling with a much broader scope than the subject study. If the MOE wants to follow suit then there is a need to take into account other municipal solid waste (MSW) recycling programs and well as recycling initiatives associated with industrial commercial and institutional (IC&I) waste and construction, demolition and landscaping (CDL) waste.
8. Job creation and the ancillary economic contributions of public and private sector initiatives are topics of considerable current interest. Annual reporting on the economic dimensions of waste management and specifically recycling programs in the Province of Ontario helps communicate the importance of recycling as an economic engine within the Provincial economy. The MOE should give consideration to annually reporting on these matters as part of its broader communications programs on waste management and recycling.
9. If the MOE decides to regularly analyze and report on the economic dimensions of recycling we recommend that they work with the WDO to assemble required information and format it in a way that it can be readily incorporated into MOE analytical and tracking models and as well as reporting formats.

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Appendix A

Industry Survey

Appendix A

Industry Survey

Purpose

The purpose of the industry survey was to obtain detailed information from two groups associated with the functioning of the Blue Box, WEEE and MHSW programs. The first group was defined as program “service providers”, both municipal and private sector participants, who undertake activity to deliver and administratively support the programs. The second group included “end users” of Blue Box, MHSW, and WEEE materials, either in an intermediate or final production/manufacturing process. The aim of these surveys was to help understand the economic activity that can be attributed to the target recycling programs and to gain insight into industry perspectives on recycling trends. The surveys had a particular focus on associated economic activity in Ontario.

Methodology

Survey instruments were developed for each of the two target groups of respondents. The service provider survey focused on information regarding annual program costs, tonnage, and FTE jobs associated with delivery of the Blue Box, MHSW, and WEEE programs. The end user survey was designed to obtain information on the value and tonnage of recyclable material utilized, with a focus on percentage reliance on recycled goods versus virgin materials. Both surveys sought to understand respondents’ perspectives on industry trends. Copies of the surveys are attached. The Ministry of Environment provided AECOM with a letter of endorsement that confirmed confidentiality of participants and data gathered in this study (see letter attached).

Service providers and end users of recyclables were targeted for participation in the survey in a variety of ways. Key Ontario municipalities with responsibility for waste management were contacted for participation in the survey as this group has responsibility for a significant proportion of the program delivery costs and/or have direct involvement at this time in WEEE and MHSW management. Major private waste management companies that provide residential recycling collection, and/or sorting/processing services were also targeted, as these providers have direct knowledge of the FTE jobs and other economic variables associated with program delivery costs. AECOM’s industry experience in the Waste Management sector helped in identifying major players to be contacted for participation in this survey as did leads from contacts made during survey administration.

End users of recycled materials were initially identified through information contained in the Ontario Blue Box Markets Overview (Stewardship Ontario, 2006). In this report, Stewardship Ontario identified major purchasers of Blue Box materials, by commodity type. The five largest buyers identified for each commodity type were contacted for participation in this survey. In some cases, the buyers were based outside of Ontario

and, therefore, were not asked to continue with the survey. In other cases, the buyers listed were not end users, but rather brokers of recycled materials. Some brokers were able to assist in identifying major Ontario-based end users of recycled materials, though many were unwilling to disclose this information. Waste Diversion Ontario (2007) surveyed service providers, brokers, and end users in a review of marketed Blue Box materials. A contact list from this survey could not be obtained. However, a key contact at the MWA identified some major Ontario-based end users of Blue Box materials. As noted above, municipal service providers also contributed end user information which was followed up as far as possible.

End users of WEEE and MHSW materials were generally not targeted for survey as the material volumes utilized from these programs that are minimal.

In summary, respondents were targeted based on references from published reports and informed respondents in both the service provider and end user surveys. The aim was not to receive a representative sample of stakeholders or the industries involved, but rather to get information from prominent industry contacts, whose economic information would likely be representative of the bulk of that sector.

Response Rates

The response rates for the two surveys were very low. The highest number of responses came from municipalities, who contract out their recycling programs and/or directly provide municipal recycling services. The private sector waste service providers were, for the most part, unwilling to participate due to corporate privacy considerations. Identified end users of recycled materials were also generally very reluctant to participate in the survey.

A total of three surveys were completed by municipalities in the GTA, one survey was completed by a private service provider, and two end user surveys were completed. The number of respondents is insufficient to influence the economic models as originally envisioned. Therefore, the economic models are based on the value of commodity sales to downstream sectors. As an alternative we used published data and model derived statistics on commodity sales to downstream sectors to enable the calculation of downstream program effects.

The results of the surveys are reported on here, as anecdotal information.

Survey Results

Service Providers

The survey exercise provided little useful information regarding FTE or other targeted information to supplements data available through the municipal data call. The one exception is municipal information regarding WEE and MHSW depot operations and associated municipal effort to collect materials through this approach.

Municipal service providers did provide insights into the expected end users for program material, particularly Blue Box materials. These contact leads were followed up as noted below.

The reluctance of private sector service providers to share corporate information was a key restriction in obtaining useful, targeted information on the municipal component of waste industry economic activity.

Recycled Material Use

The results of the surveys indicate that the current market for recyclable material use in Ontario is quite uncertain. Many of the material brokers, though unwilling to formally participate in the study, informally stated that a large portion of materials are shipped outside of Ontario. A number of the original end users identified in the Ontario Blue Box Markets Overview (Stewardship Ontario, 2006) have withdrawn from the Ontario marketplace or gone out of business and some are located outside of Ontario and have no links to Ontario except through sourcing the recyclable material. The difficulty in identifying end users is coupled with securing willing participants among those identified by key informants or previous reports.

The two end users that did complete the survey were both from the paper industry. The respondents indicated that much of the competition for recycled paper supply is from offshore (i.e. China) and this creates a major concern for their business in the future. Buyers from China are able to purchase materials at a higher price and this decreases the supply of materials in Ontario and also drives market prices upward. Another concern for printed papers is the quality of the supply and that contaminated sources have been a major concern and these concerns are increasing over time.

Study of the Economic Impacts of Recycling in Ontario

The Ontario Ministry of Environment has engaged AECOM to conduct a study to determine the contribution of Ontario's recycling and reuse industry to the Provincial economy. The focus of this study is on the "flagship" Ontario residential Blue Box program, the Phase 1 Program for Municipal Hazardous or Special Waste (MHSW) and the Waste Electrical and Electronic Equipment (WEEE) program. The study will quantify direct indirect and induced benefits to Ontario's economy generated by these programs and thereby provide a broad understanding of the economic benefits generated by this aspect of Ontario's waste diversion industry.

The results of this study will illustrate the contribution waste diversion activity makes to Ontario's economy, through accepted measures of:

- Employment;
- Income generation; and
- Value added.

Recycling Program Service Providers

AECOM is conducting set of surveys to supplement information available through published sources. Key industry participants playing roles in collection, processing, marketing and end use of Blue Box, HHW and WEEE materials are being contacted. These data are essential to understanding the economic dimension of these activities.

The aim of this survey is to apportion a percentage-based value of the recycling industry to the waste management industry as a whole and to gain an understanding of the costs associated with recycling industries.

Confidentiality

Data collected will be kept strictly confidential and only reported in aggregate. No data associated with individual firms will be provided to the Ministry or otherwise made available.

Study of the Economic Impacts of Recycling in Ontario

General Business Characterization

Company Name: _____

1. What was your main business activity in Ontario in 2008? _____
2. In the Table below, please provide your 2008 annual sales revenue related to waste management services in Ontario.

	Revenue	Cost	Employment	Tonnage
All other waste management services				
Blue Box				
MHSW				
WEEE				

3. What was your 2008 Ontario based Full Time Equivalent (FTE) workforce providing waste management services? _____
4. What percentage of your business operations (revenue, cost, employment and tonnage) are devoted to garbage versus recycling activities? _____

Recycling Program Activity

5. Please indicate the services and related FTE employment you provide through your involvement in the following waste recycling programs, as applicable to your 2008 business operations.

B – Blue Box

Service Provided	Revenue	Tonnes managed	Full Time Equivalent Employment 2008
1) Collection			
2) Processing			
3) Disposal			
4) Marketing			

C –MHSW

Services Provided (if applicable)	Percentage of Program Revenue or Budget	Percentage of Program tonnes managed 2008	Percentage of Full Time Equivalent Employment 2008
1) Collection			
2) Processing			
3) Disposal			
4) Material Marketing			

Study of the Economic Impacts of Recycling in Ontario

D – WEEE

Services Provided (if applicable)	Percentage of Program Revenue or Budget	Percentage of Program tonnes managed 2008	Percentage of Full Time Equivalent Employment 2008
1) Collection			
2) Processing			
3) Disposal			
4) Marketing			

6. What types of materials do you manage within each of these recycling programs, and their percentage (by volume) of your recycling business operations?

Material	Tonnes Managed	Percentage of Total Recyclable Material Received
Printed Papers (Newspapers, Magazines and Directories)		
Paper Based Packaging (Corrugated Board, Boxboard and Hardpack)		
Polycoat Containers		
Steel Cans		
Aluminum Cans and Foil		
PET Bottles		
HDPE Bottles		
Tubs and Lids		
Polyethylene Bags and Film		
Polystyrene		
Mixed Plastics		
Container Glass		

MHSW – Please specify:

WEEE – Please specify:

Study of the Economic Impacts of Recycling in Ontario

7. How do recyclable commodity prices affect your business and future decisions?

8. What the key issues you see in the current and near future regarding your services related to municipal recycling programs?

End Users

A secondary survey will be distributed to End Users of Recyclables, to determine the percentage of their businesses that are derived from recycled vs. virgin sources. Your assistance in identifying these end users is greatly appreciated. Please list, for each type material marketed to and end user, the most frequent buyers of such material. Please name the end user's business name and if possible, any contact information you can disclose and append any extra rows, if necessary.

Material	End User(s)

Contact Information

Company Name	
Name/Contact	
Position	
Mailing Address	
E-Mail	

- Thank you for your participation -

END OF SURVEY

Study of the Economic Impacts of Recycling in Ontario

The Ontario Ministry of Environment has engaged AECOM to conduct a study to determine the contribution of Ontario's recycling and reuse industry to the Provincial economy. The focus of this study is on the "flagship" Ontario residential Blue Box program, the Phase 1 Program for Municipal Hazardous or Special Waste (MHSW) and the Waste Electrical and Electronic Equipment (WEEE) program. The study will quantify direct indirect and induced benefits to Ontario's economy generated by these programs and thereby provide a broad understanding of the economic benefits generated by this aspect of Ontario's waste diversion industry.

The results of this study will illustrate the contribution waste diversion activity makes to Ontario's economy, through accepted measures of

- Employment;
- Income generation; and
- Value added.

End Users of Recycled Materials

AECOM is conducting data collection surveys to supplement information available through published sources. Key industry participants playing roles in collection, processing, marketing and end use of Blue Box, HHW and WEEE materials are being contacted. These data are essential to understanding the economic dimension of these activities.

The aim of this survey is to determine a percentage-based value for the use of recycled materials in your Ontario based business and industry sector as a whole. These percentages will be used to help quantify the economic contribution of recyclable materials in your industry.

Confidentiality

Data collected will be kept strictly confidential and only reported in aggregate. No data associated with individual firms will be provided to the Ministry or otherwise made available.

Study of the Economic Impacts of Recycling in Ontario

As far as possible, please answer the following questions based on your **Ontario business activity only**.

1. What was your main business activity in Ontario in 2008?

2. In the Table below, please summarize your 2008 Full Time Equivalent (FTE) Workforce, the ratio of recycled material to virgin material inputs, gross sales from Ontario production and the costs of operation.

Category	Response
Employment (FTE)	
Total Operating Costs (\$ value)	
Virgin Materials Cost (\$ value or % of total)	
Recycled Materials Cost (\$ value or % of total)	
Waste Management Costs (\$ value or % of total)	
Gross Sales (\$ value)	

Recycled Materials

3. Please indicate the types of recycled materials you purchased for your operations in 2008. If possible, provide the name of the municipality or other service provider from which you purchase these materials. For each type of material, please estimate the percentage of recycled materials represented by that product.

Material	Tonnage of Recycled Material Purchased (tonnage)	Input Value (\$)	Source(s)
Printed Papers (Newspapers, Magazines and Directories)			
Paper Based Packaging (Corrugated Board, Boxboard and Hardpack)			
Polycoat Containers			
Steel Cans			
Aluminum Cans and Foil			
PET Bottles			
HDPE Bottles			
Tubs and Lids			
Polyethylene Bags and Film			
Polystyrene			
Mixed Plastics			
Container Glass			
Total			

Study of the Economic Impacts of Recycling in Ontario

4. What are the key issues you see in the current and near future regarding your business related to recycled materials?

5. Do you see your business using more or less recycled materials **relative to** virgin materials in the next five years? If so, can you estimate the percentage split in five years?

Contact Information

Company Name	
Name	
Position	
Mailing Address	
E-Mail	

- Thank you for your participation -

END OF SURVEY

Ministry of the Environment Ministère de
135 St. Clair Avenue West l'Environnement
Toronto ON M4V 1P5 135 Avenue St. Clair Ouest
Toronto ON M4V 1P5



July 16, 2009

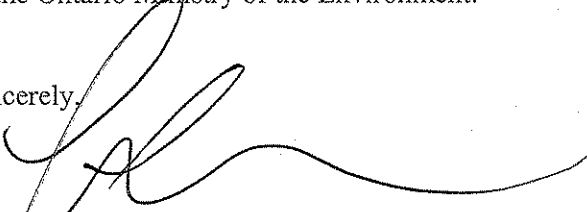
Attention: To whom it may concern

AECOM Canada Ltd. is undertaking a study for the Ontario Ministry of the Environment on the economic benefits of recycling in Ontario. The study will attempt to quantify the economic benefits to Ontario (e.g. number of jobs, annual payroll they generate, industrial output generated, sales, value added, tax revenue) from recycling/reuse of waste materials from Ontario's Blue Box Program, Municipal Hazardous or Special Waste (MHSW) Program and Waste Electrical and Electronic Equipment (WEEE) Program.

In the process of undertaking this study, AECOM will be gathering data on the disposition for recycling or reuse of materials from these diversion programs, and may be seeking input from you in this regard. In advance, the Ontario Ministry of the Environment appreciates any assistance you may provide to AECOM in obtaining this data.

Unless permission is granted, company-specific information you provide to AECOM will not be provided to the Ontario Ministry of the Environment.

Sincerely,


per John Vidan
Director
Waste Management Policy Branch

Appendix B

Multipliers

Appendix B

Multipliers

Table B-1 Waste Management Sector Multipliers

		Calibration (\$1M)	Impacts / \$
GDP	Direct	\$630,179	\$0.63
	Indirect	\$191,496	\$0.19
	Induced	\$510,070	\$0.51
	Total Impact	\$1,331,745	\$1.33
Labour Income	Direct	\$246,472	\$0.25
	Indirect	\$123,144	\$0.12
	Induced	\$295,693	\$0.30
	Total Impact	\$665,309	\$0.67
FTE Jobs	Direct	4.75	0.0000048
	Indirect	2.54	0.0000025
	Induced	6.28	0.0000063
	Total Impact	13.57	0.0000136
Gross Output	Direct	\$1,000,000	\$1.00
	Indirect	\$358,122	\$0.36
	Induced	\$850,117	\$0.85
	Total Impact	\$2,208,239	\$2.21

Table B-1 shows the multipliers and ratios per \$1 million (Calibration (\$1M)), and \$1 (Impacts / \$) of Waste Management Industry output shocks. This table shows economic effects related to the output shocks at a direct, indirect, induced and combined level.

Table B-2 Downstream Economic Multipliers

		Paper		Aluminum		Steel		Plastics		Glass	
		Calibration (\$1M)	Impacts / \$	Calibration (\$1M)	Impacts / \$	Calibration (\$1M)	Impacts / \$	Calibration (\$1M)	Impacts / \$	Calibration (\$1M)	Impacts / \$
GDP	Direct	\$337,533	\$0.34	\$99,909	\$0.10	\$324,779	\$0.32	\$356,596	\$0.36	\$448,024	\$0.45
	Indirect	\$458,060	\$0.46	\$135,585	\$0.14	\$178,626	\$0.18	\$183,376	\$0.18	\$195,180	\$0.20
	Induced	\$574,327	\$0.57	\$211,395	\$0.21	\$360,366	\$0.36	\$461,008	\$0.46	\$554,397	\$0.55
	Total Impact	\$1,369,920	\$1.37	\$446,889	\$0.45	\$863,771	\$0.86	\$1,000,980	\$1.00	\$1,197,601	\$1.20
Labour Income	Direct	\$198,846	\$0.20	\$73,190	\$0.07	\$154,843	\$0.15	\$220,421	\$0.22	\$287,551	\$0.29
	Indirect	\$217,333	\$0.22	\$79,995	\$0.08	\$106,292	\$0.11	\$113,643	\$0.11	\$114,186	\$0.11
	Induced	\$332,943	\$0.33	\$122,548	\$0.12	\$208,908	\$0.21	\$267,251	\$0.27	\$321,390	\$0.32
	Total Impact	\$749,122	\$0.75	\$275,733	\$0.28	\$470,043	\$0.47	\$601,315	\$0.60	\$723,127	\$0.72
FTE Jobs	Direct	3.41	0.00	1.05	0.00	1.95	0.00	4.38	0.00	4.17	0.00
	Indirect	4.68	0.00	1.49	0.00	1.94	0.00	2.05	0.00	2.01	0.00
	Induced	7.08	0.00	2.60	0.00	4.44	0.00	5.68	0.00	6.83	0.00
	Total Impact	15.17	0.00	5.14	0.00	8.33	0.00	12.11	0.00	13.01	0.00
Gross Output	Direct	\$1,000,000	\$1.00	\$1,000,000	\$1.00	\$1,000,000	\$1.00	\$1,000,000	\$1.00	\$1,000,000	\$1.00
	Indirect	\$406,233	\$0.41	\$263,384	\$0.26	\$362,875	\$0.36	\$412,755	\$0.41	\$398,137	\$0.40
	Induced	\$957,212	\$0.96	\$352,326	\$0.35	\$600,611	\$0.60	\$768,347	\$0.77	\$923,995	\$0.92
	Total Impact	\$2,363,445	\$2.36	\$1,615,710	\$1.62	\$1,963,486	\$1.96	\$2,181,102	\$2.18	\$2,322,132	\$2.32